

# THE IRON AGE

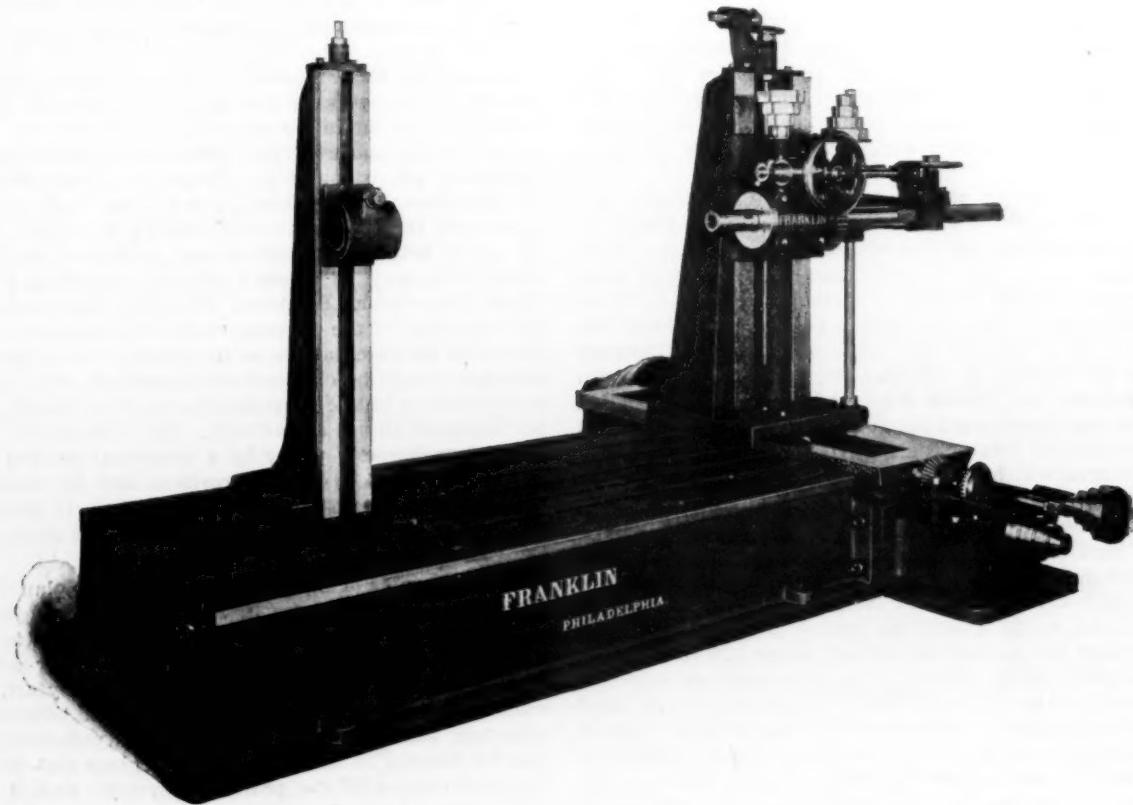
THURSDAY, OCTOBER 10, 1901.

## The Franklin Boring, Drilling and Milling Machine.

A new horizontal boring, drilling and milling machine has been designed by the Franklin Machine Works, Incorporated, of Philadelphia. This tool, while it conforms in its principal features to the larger and more expensive machines, is able to do the boring and a large amount of the milling heretofore necessarily done on a long milling machine. It covers an extra wide range and great variety of work, being applicable to all kinds of boring, tapping, reaming and various kinds of milling, such as key seating long, heavy shafting in short places, which operation formerly required a large machine. It can be used for face milling with a rotary

this case, also relieves the milling machine of some of the large work which would require a larger tool. The spindle is geared very powerfully for heavy work and with ample power for drilling. It has 5-inch step cone, which gives ten changes of feed and speed. The gearings are made of steel, cut from the solid, and the bearings are all lined with bronze. This machine can be built with a plain or compound table or both. The platen is 42 x 84 inches, well ribbed to carry large and heavy work, the tail support being built with a horizontal adjustment. Accurately cut adjusting screws and micrometer adjusting dials are also attached if required.

**The Everett Furnace.**—The Everett Furnace, Easton, Pa., owned and operated by Joseph E. Thropp,



THE FRANKLIN BORING, DRILLING AND MILLING MACHINE.

cutter head, like a rotary planer, and will also do all kinds of end milling, and can be used for cotter drilling and cutting key seats with an end mill. Large castings can be placed on the platen and all work finished without removing the casting.

The spindle, which is made of hammered crucible steel, is 3 inches in diameter, and feeds through a gun metal sleeve. The boring bar has 24 inches feed and has a No. 5 Morse taper hole in the end; also a pin hole for retaining the bars and milling tools in their place.

The head has a vertical adjustment of 30 inches and can be securely clamped in any position for milling. The column carrying the spindle head has automatic feed in both directions, giving 42 inches of horizontal movement to the spindle for milling. The spindle has feed in either direction for boring and counter boring both ends of cylinders. This machine, among other things, takes the place of the old style boring machine, where the work had to be adjusted to the spindle instead of adjusting the spindle to the work, and, as in

started on its sixth blast on September 10. During the shut down for relining very extensive repairs and improvements have been made. A new double branch downcomer was built and two additional large explosion doors were placed on the furnace. The arrangement of the tracks in the stock house was changed so as to permit the storage of larger quantities of raw materials and ten large pockets, with a capacity of 800 tons limestone or 1000 to 1200 tons iron ore, were built. The furnace has been equipped with the Sahlin patented bosh jacket, permitting a larger bosh diameter than is possible with other styles of bosh protection and the furnace has already reached an output of about 200 tons of foundry iron per day. As the equipment consists of four vertical blowing engines capable of blowing 36,000 cubic feet of blast per minute at a pressure of 15 to 18 pounds per square inch, four batteries of boilers aggregating from 1500 to 1800 horse-power, three Cowper hot ovens 18½ x 75 feet and one Hartman hot oven, 16 x 87 feet, it will be seen that the furnace is thoroughly well equipped.

and it is expected in a short time that the monthly output will reach 6500 to 7000 tons of standard foundry iron, compared to the previous record of 5000 to 5500 tons per month. In conjunction with the blast furnace Mr. Thropp also owns and operates a limestone quarry within 2 miles of the furnace, which produces the flux; a coal and coke works 16 miles from the furnace, which produces nearly all of the coke required at the furnace, and large iron ore properties in Pennsylvania, West Virginia and Maryland, which have been undergoing development for several months, and which will shortly be shipping from 1200 to 1500 tons of ore per week to the furnace.

## A New Plan for Reciprocity.

### A Minimum and Maximum Tariff.

WASHINGTON, D. C., October 8, 1901.—Prominent Senators and Representatives who have recently visited Washington are giving very serious consideration to a new plan looking to the remodelling of existing laws relating to reciprocity and the laying of a broad foundation for the execution of a reciprocal trade policy of the widest possible scope. This plan, which has been discussed to some extent with President Roosevelt, involves the abandonment of the reciprocity treaties now pending in the Senate, the repeal of Sections 3 and 4 of the Dingley act, under which the treaties have been negotiated, and the substitution for this section of a maximum and minimum tariff, such as is now maintained by France, Germany, Russia and other European nations.

The projectors of this new plan of reciprocity embrace not only the opponents of the French and other pending treaties, but the advocates of a broader policy designed to render the President less dependent upon Congress in the matter of negotiating and ratifying treaties, but at the same time regulating specifically the extent to which the protection of any given industry may be reduced by treaty. The treaties with France, Argentina, the British West Indies, &c., now pending were negotiated under Section 4 of the Dingley act. An inspection of this provision will show at a glance the difficulties which have attended the effort to secure the promulgation of these conventions. The section reads as follows:

"SEC. 4. That whenever the President of the United States, by and with the advice and consent of the Senate, with a view to secure reciprocal trade with foreign countries, shall, within the period of two years from and after the passage of this act, enter into commercial treaty or treaties with any other country or countries concerning the admission into any such country or countries of the goods, wares and merchandise of the United States and their use and disposition therein, deemed to be for the interests of the United States, and in such treaty or treaties, in consideration of the advantages accruing to the United States therefrom, shall provide for the reduction during a specified period, not exceeding five years, of the duties imposed by this act, to the extent of not more than 20 per centum thereof, upon such goods, wares or merchandise as may be designated therein of the country or countries with which such treaty or treaties shall be made as in this section provided for; or shall provide for the transfer during such period from the dutiable list of this act to the free list thereof of such goods, wares and merchandise, being the natural products of such foreign country or countries and not of the United States; or shall provide for the retention upon the free list of this act during a specified period, not exceeding five years, of such goods, wares and merchandise now included in said free list as may be designated therein; and when any such treaty shall have been duly ratified by the Senate and approved by Congress, and public proclamation made accordingly, then and thereafter the duties which shall be collected by the United States upon any of the designated goods, wares and merchandise from the foreign country with which such treaty has been made shall, during the

period provided for, be the duties specified and provided for in such treaty, and none other."

It is seen in the first place that there is room for question as to whether any treaty not ratified within two years from July 24, 1897, the date of the approval of the Dingley act, is valid. It is also a matter of judgment as to what constitute the "natural products" of foreign countries and "not of the United States," which alone can be placed on the free list by reciprocity treaty. Finally, it is provided that in addition to the ratification of a convention by the Senate, which requires a three-fourths vote, it must be "approved by Congress," which is taken to mean that specific legislation in the nature of a joint resolution must be passed by both House and Senate in order to make the treaty the law of the land.

It is known that President McKinley keenly appreciated the difficulties in the way of executing the reciprocity provisions of the Dingley act, and the assertion is freely made here by prominent men who conferred with him at Canton last July that he then gave very favorable consideration to the proposition looking to the substitution of a double column tariff, to be used as the basis of treaties which, when negotiated, could be promulgated without further action by either House of Congress. While there is no very tangible evidence indicating the extent to which President McKinley examined into this plan, it is well known that he was greatly annoyed at the action of the Senate in hanging up all the pending treaties, and that he permitted Reciprocity Commissioner Kasson to withdraw and directed the suspension of the work of the Reciprocity Bureau of the State Department in consequence. It is also true that he frequently spoke of the difficulty in executing the reciprocity provisions of the Dingley act, which involve the transmission to Congress, one by one, of all treaties negotiated thereunder, thereby putting it in the power of a few Senators to defeat any particular treaty to which they may be opposed without imperiling others which they favor. President McKinley also expressed the belief that if the question could be presented to Senators and Representatives as to whether the reciprocity principle should be executed or abandoned entirely, the overwhelming public sentiment in its favor would compel Congress to act accordingly. The difficulty of executing a reciprocity policy by a piecemeal method was deeply impressed upon the President and his advisers, and the necessity of changing the method, if practical results were to be secured, was the subject of more than one Cabinet discussion.

The advocates of the double column tariff plan claim numerous advantages for it, the principal ones being, 1, the fact that Congress would not delegate to the President authority to reduce the duty on any article not to exceed 20 per cent., as under the Dingley act, but would specify as to each item of the tariff how much reduction might be made by reciprocity convention, thereby keeping in the hands of the House and Senate complete control of the protective system; and, 2, the ability of the Executive to promulgate any desired treaty without its being required to run the gauntlet of the Senate and House, where a determined minority can defeat any treaty, even on open ballot, if it can control one vote in excess of one-fourth the membership of the Senate.

In this connection, as an illustration of the smoothness with which such a plan would operate, those who favor it point to the fact that under Section 3 of the Dingley act a number of treaties were negotiated and promulgated soon after the passage of the act. Section 3 specifies the reductions that may be made upon crude tartar, brandies, champagne, still wines, paintings, statuary and other works of art, &c., through reciprocal agreements, such agreements taking effect upon promulgation by the President without further reference to Congress. A maximum and minimum tariff, it is contended, would operate in exactly the same way, but much more comprehensively, as it would provide the exact amount of reduction that might be made by the President on any item of the entire set of schedules.

Among those who favor this plan there are some who are opposed to any other tariff legislation, and it is urged by these that a double column tariff would not neces-

sarily mean any revision of the rates now in force, which would constitute the maximum or general tariff, while the reduced rates to be fixed by Congress would be known as the preferential or conventional tariff.

President Roosevelt has given no intimation of his views concerning this project, but as he will begin the preparation of his annual message to Congress within the next 30 days, he will give his very serious consideration to the whole problem of reciprocity in the meantime. Interests which have secured concessions through the pending treaties are opposed to this new plan, which they naturally apprehend would mean the abandonment

of these men is quite large. President Shaffer has made vain efforts to have several blacklisted men reinstated.

#### The Cabot-Patterson Hot Blast Stove.

John Patterson, blast furnace manager for C. Cambell & Co. of Workington, England, and John W. Cabot of Johnstown, Pa., have brought forward a design of hot blast stove whose object is to obviate the difficulties and expense in operation caused by the accumulation of flue dust which collects in them. The conspicuous feature of the design is that the stove is so arranged that all dirt and fine dust can be blown out by means of the cold blast. It is, in fact, constantly maintained in a condition free of dust.

Blast furnaces using a considerable percentage of fine ores in the ore mixture and driven at the rate now prevailing in good practice throw out a large quantity of fine ore dust, which is carried by the gases into the stoves, where it adheres to all parts of the brick work. In addition, there is always present in the gases more or less of a very fine or impalpable fume. Stoves soon become coated with these fine powders. Their efficiency is thus reduced and soon they must be taken out of service and cleaned by hand.

There is one particularly bad effect produced by the fine ore dust upon the furnace working which has not been heretofore pointed out with sufficient clearness. This dust, consisting as it does of 65 to 70 per cent.

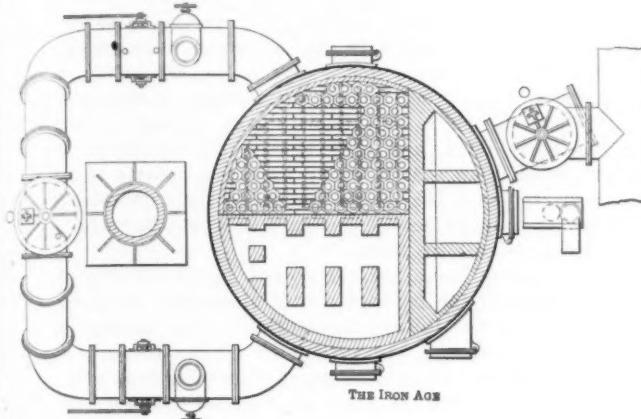


Fig. 1.—Plan and Section.

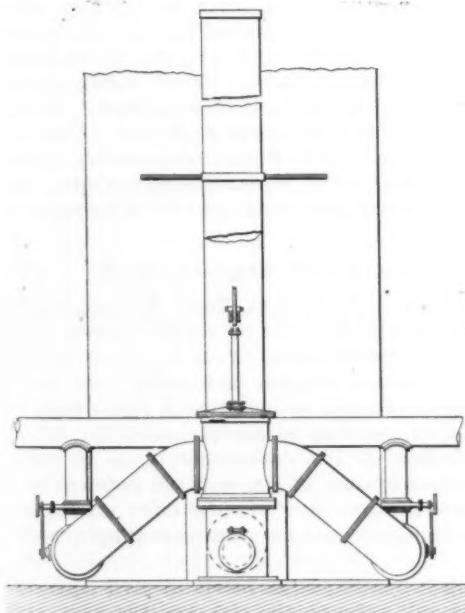


Fig. 2.—End Elevation.

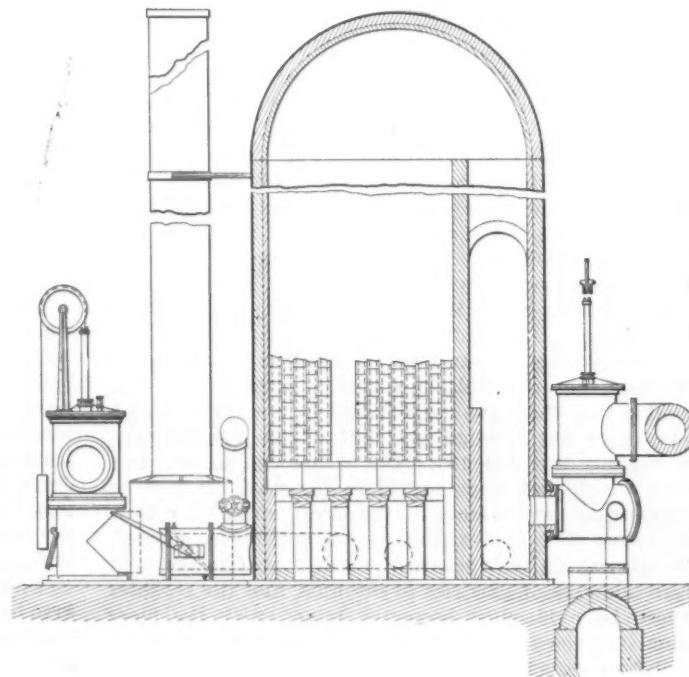


Fig. 3.—Vertical Section.

#### THE CABOT-PATTERSON HOT BLAST STOVE.

of these conventions and the negotiation of others. While similar concessions might be secured in the new treaties there would be the risk of losing what has been gained, hence the proposition is viewed with disfavor. The strongest opponents of the pending treaties are disposed to urge it as a method of securing the withdrawal of these conventions. Should the plan be adopted any new treaties would necessarily be limited in their concessions to the specific reductions agreed upon in advance by Congress.

W. L. C.

The national officials of the Amalgamated Association are reported as considering the levying of an assessment for the benefit of strikers who were willing to return to work, but who were turned away. The num-

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the difficulty of keeping a furnace on a uniform grade of iron as regards silicon and sulphur is increased unnecessarily by reason of the varying quantities of flue dust caught in the hot blast stoves.

In the design of the Cabot-Patterson stove, as shown by the accompanying engravings, the changes from the older forms of stoves are as follows: As applied to the ordinary form of two-pass stove, the principal change consists in dividing the regenerator portion of the stove into two equal parts. This is done by merely building a partition wall in the middle of the bottom part of the stove, under the regenerator, which obviously divides the regenerator into two equal halves without other change in the brick work. Each side of the regenerator has the same area of heating surface in the passage ways. Each half is connected to the common draft chimney by a separate chimney flue, carried in a separate branch pipe, the two pipes being brought together at the main chimney valve, whence a flue leads into the chimney. Upon each chimney flue is a quick opening valve of the butterfly pattern, and also an ordinary cold blast valve making connection with the cold blast main, the cold blast valve being situated between the butterfly valve and the regenerator part of the stove in each case. The chimney valve is of the ordinary type. Each stove has its own draft chimney standing on an independent foundation, and there are no draft sewers or gas sewers, and hence no place outside of the stove itself where flue dust can accumulate. The other features are not different from other designs of stoves.

The operation is as follows: The stove being on gas and the products of combustion passing out through the two branch chimney flues to the chimney, as usual, and it is desired to put it on blast, the gas is taken off and the stove closed in the ordinary manner. It is then filled with cold blast by means of the two cold blast valves, the butterfly valves being both closed. The stove is then full of blast at engine pressure. The main chimney valve is open, one of the cold blast valves is closed, and then to clean the stove the butterfly valve on the same side as the closed cold blast valve is suddenly opened for an instant. This causes the cold blast to rush up the passages on one side of the stove and down through those on the other side, and out through the branch chimney flue to the chimney, carrying with it the flue dust, which is thence blown into the air above the chimney. This puff of blast may be repeated, or the direction of it reversed by opening the butterfly valve on the other side in a similar manner. By thus causing the whole amount of blast in the stove to suddenly pass out through the half of the passageways the velocity is sufficiently great to dislodge all dust and fume which may have settled in the stove or may be adhering to the surfaces of the brick work. If this is done each time of changing stoves and before a fresh stove is put on the furnace the stoves are always kept clean and free of particles of ore dust, and the troubles caused by oxide dust becoming mixed with the blast going into the tuyeres are avoided. And, furthermore, the laborious, expensive and disagreeable work of cooling down a stove and scraping out the accumulations periodically is dispensed with, and the life of the brick work in the structure increased and preserved.

Stoves of this general type have now been in use for a number of years at the works of Charles Cammell & Co. at Workington, England, with marked success. Since their construction it has never been found necessary to clean them except by this system of blowing out through the chimney. They have never been cooled down for hand cleaning, and their efficiency is as good to-day as it was when they were first built. The expense incurred for this class of work at most blast furnace plants has been, therefore, *nil*; and, furthermore, the general cost of repairs and maintenance has been, for the reasons above indicated, merely nominal.

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It is claimed the recent strike in the hoop, sheet and tin plate mills cost the Amalgamated Association \$82,060 in benefits alone.

## Commercial Aspects of Roman Life.

BY HROLF. WISBY.

In ancient Rome it was considered a crime to be poor. It would be difficult to find a better proof of the esteem in which capital was held by the Romans, and their idolatry of wealth for wealth's sake. The origin of Roman wealth was the Roman triumphs, which paved the way for commercial enterprise on a hitherto unprecedented scale.

It cannot be denied that the political system of the time was characterized by the regardlessness and selfishness of the moneyed classes, which rose to power supreme almost as rapidly as the great middle class disappeared and mingled with the wretched plebeian element. "A good watch dog," says a Roman writer on economics, "must not be on too friendly terms with his 'fellow slaves.'" The slave and the ox were treated on the same level, and they were cared for from no other reason than that it would have been costly to let them starve; both alike were sold when their usefulness as slaving animals ceased, because it would have been bad economy to keep them.

Nevertheless, with all the grave faults of Roman rule, in spite of the barbarity and inhumanity of many of the strongest Roman institutions, the mercantile spirit expanded with every triumph of the Cæsars, so that when Rome was at the height of her military glory she had also become the great commercial center of the world at the time. The position of the Eternal City toward the ancient world may be compared to the position of London toward the modern world, in so far that Rome was the controlling center of the money market. The parallel does not hold good when we begin to compare the trade of Rome with that of London, for Rome did not figure as an export city at all, merely confining herself to a vast, disproportionate import trade drawn from the numerous shipping ports of her domain. Right here we pick up the thread that shall guide us to a true understanding of the element in Roman business life which encouraged the founding of mercantile associations and developed commercial gatherings on an international scale of attendance.

### A Disgrace to Accept Money for Work.

When we wish to know why Rome did not export we must penetrate to the core of Roman society, and there we find the true obstacle in the shape of an apparently harmless local custom invented by the patricians. It originated with the idea that it was disgraceful for a man of standing to accept money for work. However desirable such a custom might be if introduced into certain phases of our national political system, it produced a much more harmful effect on Roman life than the capitalist system, pure and simple, could have done.

First of all, it shattered the bonds of civil equality, broadened the gulf between the rich and the poor, and established a plutocracy the like of which the world has never seen. It raised social barriers everywhere, not merely between the laborer or the artisan and the landlord or the manufacturer, but also between the army officers and the military tribunes, and between the courtiers and the magistrate. Such barriers exist to-day in a modified shape throughout Europe, but during Roman rule they were so high and so forbidding that the most productive branches of business were abandoned—because it was considered disgraceful to work for money. This principle made it possible for the rich man to lord it over his fellows, and it became a sin to be poor. It forced the poor man into slavery, the army or the public manual service, and the manufacturer and the tradesman, who, in spite of some means, could not afford to do work for nothing, were driven out of existence. The capitalist system reacted on agriculture and the various branches of industry and commerce with such sweeping force that the home trade fell into decay in preference to the dealing in money and the farming of the public revenues, which really formed the mainstay of the Roman State. The chief productive

sources of the country were paralyzed, and instead of free labor Rome had brought upon herself the curse of slave labor. Historians record eight guilds of craftsmen which were among the institutions existing in Rome from time immemorial, and which were recruited from the ranks of free men until slave labor was substituted. There were the goldsmiths, the coppersmiths, the carpenters, the potters, the dyers, the fullers, the flute blowers and the shoemakers, a list substantially covering the class of tradesmen working to order for others in the very early times, when the baking of bread, the art of healing the sick and the spinning of wool into garments were not known as professions. The importance of these craftsmen guilds ceased when slave labor was substituted, and all handicraft was looked down upon and despised.

We have seen how this idea of disgrace by money getting, a mere whim of the patricians, practically revolutionized Roman life at a time when it was vital to maintain the national productive sources. It is true that commerce flourished, but it is no less true that it was confined to importing what Rome needed and could not herself produce. Rome had nothing to sell except money. The most serious consequence of the decay of the national industries, notably agriculture, which has always been the chief resource of Italy, was the difficulty experienced by the Roman State in supplying adequate food supplies to the multitude. If the small farmer, the tradesman and the artisan had continued to exist, in fact if the freedom of the Roman citizen had been preserved, the empire would undoubtedly have been able to raise its own supplies, and the home industries might have increased to such an extent as to form an item of export. But Rome converted herself into a vast military camp in which the commanding officers were capitalists and the soldiers were slaves, and consequently the burden of supplying grain, pork, wine and oil fell upon the commanding officers. How perilous any failure in this direction might be to the peace of the city and the safety of the officers is well illustrated by the letters of Symmachus covering this matter. Serfdom on such a large scale, as contrasted with the healthy competition of free labor, naturally encouraged the import trade at the expense of the exports, but the historical reason for this condition of affairs remains, curiously enough, a mere patrician whim.

#### Vocation Compulsory.

To truly understand ancient Roman commercial life we must not lose sight of the fact that toward the close of the empire a strong effort was made to prevent a free circulation among the various callings and trades of life, and to keep the multitude penned in according to a system of social caste similar to that of India. Men were compelled to follow the same trade or occupation as their fathers, whether or no they liked it. Those engaged as sailors in bringing the grain from Africa to the public stores; those working as bakers, turning the flour into loaves for the populace; the butchers who brought pigs from Samnium, Lucania or Bruttium; the purveyors of wine and oil, the stokers who fed the furnaces at the public baths, were compulsorily bound to their vocation and denied the liberty of choosing a profession. It was the principle of rural serfdom applied to the multitudes of Rome, and it gradually absorbed every element in Roman society, except the capitalists, in one great national slavery. The object of the caste system was to keep people of various classes from making combinations against the wealthy, and while the Roman State was successful, as a rule, in averting plebeian uprisings, it was finally obliged, after centuries of supreme sovereignty, to yield to the foreign invaders. In their anxiety to pen in the populace the capitalists lost sight of the fact that they were at the same time enfeebling the people, robbing it of its former national pride and patriotism, and only too late did they discover that from such people could not be drawn the kind of Roman soldier that made the legions of Julius Caesar famous. Public esteem of the military service, at one time boundless, began to decline as soon as slaves were substituted for freemen, and toward the close of the fourth century it was detested so strongly that the in-

crease of self mutilation to escape conscription had to be checked by the most severe punishment.

With this social basis in our mind, we may proceed to consider the more distinctly commercial aspects of Roman life, and its development in bodies and gatherings for the regulation and promotion of mercantile interests.

#### Roman Wealth.

Roman wealth, of which so much has been written, was not so very remarkable for magnitude as for endurance. In this respect it forms a curious contrast to American wealth, which is truly remarkable for its magnitude, and which must continue for several centuries to come before we can begin to compare it with that of Rome as to endurance. We are much richer than the Romans, but it remains to be seen if we shall stay rich as long as they. Although Lucius Paulus, with an estate of 60 talents, or \$70,000, did not figure as a wealthy Senator, we know that the value of \$100,000 was considered the beginning of riches in ancient Rome. Five times this amount was a princely fortune, and only those in high office, and such as had been governors of wealthy provinces, lorded it over millions. But money brought in more in those days, and luxuries could be had for a song on account of the instrumentality of the slaves.

When the mercantile spirit began to make itself felt in earnest, it emanated as the spirit of the capitalist, and as such it pierced and permeated nearly every station and department of social life. Even the pursuit of agriculture and the government of internal affairs became game for the capitalists. A species of mercantile morality, which discountenanced as squandering all forms of giving away without recompense, seems to have settled down into the conscience of the Roman people, and even legislation was obliged to yield to it. Thus the giving of presents and bequests, and the undertaking of securities, were subjected to restrictions by decree of the burgesses, and heritages if not claimed by the nearest relative were regularly taxed. The idea of an inheritance tax seems also to have occurred to the Roman mind. Another form of mercantile morality, which was undoubtedly the most useful in establishing Roman virtue before the intervention of slavery, was that which made respectability, honor and punctuality the three essential requirements of the business man. Every citizen was morally bound to keep an account book of his income and expenditure. In every well conducted household there was, accordingly, a separate account chamber (tablinum), and every one took care not to die without having made a will. Those household books were admitted as valid evidence in any Roman court of justice, just as the merchant's ledger of to-day may serve a similar purpose. The conventional respectability of the Roman business world was particularly noticeable in the gradual but strict enforcement of the rule that no respectable man should allow himself to be paid for his services. What this rule, incorporated as a principle and pushed to its last extremity as an element in society, brought about we have already mentioned. Suffice it to add that magistrates, officers, jurymen, guardians, and in general all respectable men entrusted with public functions, refused to accept recompense for their services and confined themselves merely to compensation for their outlays. This was the only pleasing and socially useful aspect of this otherwise ludicrous rule.

#### Commercial Associations.

One of the most far reaching results of the Roman business spirit was the extraordinary encouragement given, sometimes by the very nature of the capitalist system, to the formation on an extensive scale of commercial associations. In Rome these institutions were primarily suggested by the system of the government in employing middlemen for the transaction of its business. Considering the scope of the deals it was natural, as well as expedient for the sake of maximum security, that the capitalists should undertake such leases and contracts not as individuals, but in partnership with several other parties of responsibility. Indications

point to the existence among the Romans of the feature so characteristic of the modern business world—namely, the consolidation of rival companies to jointly establish trade monopolies for the control of the output and the selling price. It was customary for business men belonging to the same associations and dealing in the same product to put their heads together and form what we would call a joint stock company, into the treasury of which each member would pay his share, outsiders being excluded. If there were 12 members in the syndicate the stock was owned exclusively between them, and the profits were pocketed by them. There was no attempt to "float" the market, and there does not seem to have existed any market in stocks in ancient Rome, in spite of the great development in the money lending and general banking business. Accordingly such anomalies as "watered" stock were unknown, and as there were no subscriptions so was there no public interest manifested in the various syndicates, which conducted their business behind closed doors, or rather portières.

#### The Syndicate System.

In transactions involving considerable risks, especially transmarine shipping, the syndicate system was so extensively adopted that it practically took the place of business insurance, which was, however, unknown to antiquity as an institution. Probably the most common and stupendous of these insurance schemes was the so-called nautical loan, through the agency of which the risk and profit of transmarine shipping were proportionally distributed among the owners of the vessel and the cargo and the capitalists advancing money for the voyage. The rule followed by the Roman capitalists was less liable to ruin them than the methods adopted in our business world, for the Roman economists held that it was advisable to take small shares in many speculations rather than speculate independently for large stakes. Cato advised his business associates not to fit out a single vessel for his money, but in concert with 49 other capitalists to construct 50 ships and take an interest in each to the extent of one-fiftieth part or share. Naturally this introduced hitherto unknown complications in the matter of keeping accounts, but the Roman merchant successfully overcame this obstacle through his punctuality and close attention to detail, and besides he possessed in his system of management by freemen and slaves a far more preferable machine, from the point of view of the ancient merchant, than our counting house system. These various mercantile associations and companies exerted a strong influence on Roman economy, private as well as national. To quote the words of Polybius, there was hardly a Roman citizen of means who had not been involved as an avowed or silent partner in leasing the public revenues, and it was common for capitalists to invest the majority of their fortunes in shares bought from the various commercial associations.

#### Contractors' Companies.

During Rome's greatness the transactions of her merchants fully kept pace with the contemporary development of political power. Closely connected with the business of money lending was the institution of the contractors' system. Capitalists belonging to various associations got together and formed separate contractors' companies to take over and carry out the various municipal national contracts. This was done to a much larger extent than is the case with the leasing of public contracts in this country, which is noted for turning over more enterprises for private speculation than any European government. Bids were opened not only for building and construction undertakings, but for harvesting the national crops, for grinding the same into flour and for supplying the city of Rome with provisions of certain specified kinds.

It is not to be supposed that the remarkably developed commercial system of Rome, vast in proportions and subtle in detail compared to the business standards of antiquity, should have lacked permanent meeting places for the gathering of capitalists similarly interested in trade. In fact, several Roman writers of note

tell us plainly that such places and such gatherings were as common as market fairs, and possibly by reason of their frequent occurrence no writer has seemed to think it worth his while to make a record of them. That these gatherings were often of international importance has been fully demonstrated by the evidence of Roman historians, and we know that not infrequently the number of attending members was so large and so representative that the gatherings assumed the significance of commercial congresses, involving not only local and national interests, but also conditions in the conquered provinces of the empire. Long before such gatherings ascended to real prominence religious festivals paved the way for them. The idea of getting together in great masses could not be carried out without business in some shape ensuing from it. Thus the great annual assembly before the temple of Voltumna in Etruria was originally a religious festival, but gradually business interests began to manifest themselves, and the attention of the assembly became diverted between worship before the temple and trading at the fair that was subsequently held at the same place. The business part of the Voltumna festival gradually assumed such proportions, and such was the increase of Roman capitalists in attendance, that it was in fact more of a commercial congress than a religious assembly. Perhaps the most important of all the ancient Italian fairs, that gradually became international meeting places for traders the world over, was that held under the shadow of Mount Soracte, in the grove of Feronia, on the plain of the Tiber.

#### Roman Fairs.

Such fairs were generally named "mercati," and they reached their highest development in Italy during the reign of the Cæsars. In Rome the fairs branched out according to the nature of the principal business involved, and there also we find the first attempt of antiquity to separate the fair from the congress. It became the rule for commercial associations to convene for the purpose of discussing their interests and promulgating future business policy. A first these gatherings took place at some court or forum, which was hired for the occasion, but as the transactions increased in magnitude special buildings, or *fora*, were erected for the permanent use of the various commercial congresses, to which the property belonged. So, while a forum was originally a place for the administration of justice, another class of *fora* crept into existence in Rome, and these buildings served not only as meeting places for the merchants, but were also utilized for the exhibition of samples of both foreign and domestic merchandise. The latest historical evidence points to the conclusion that the *fora commercialia* (*mercati*), or the commercial *fora*, were more numerous than the so-called *fora judicialia*, or the judicial *fora*, of which the greatest, the Forum Romanum, still remains, next to the Coliseum, the most notable ruin of ancient Rome. The *fora commercialia* at their highest development may, to a certain degree, be regarded as the commercial museums of ancient Rome. In any event they supplied the trade information then obtainable, and by exhibiting the goods from abroad as well as domestic manufactures they exerted a similar influence, necessarily in a crude way, on the business life of the Romans, as the commercial museums exert on the modern business world.

#### The Influence of Good Roads.

The instrumentality of good roads aided more than any other factor in the growth and importance of the Roman commercial forum. When the empire was at the summit of its glory it was intersected by a system of public highways which rendered intercourse between the different parts of Europe easy and comparatively rapid. As the public roads took the place of telegraphs, railways and steamboat service in those days, the importance of such a system of highways can be imagined, and without them the Roman commercial gatherings would not have been able to assume an international character. From three separate gates of Rome issued three great main roads. The most famous of these was the magnificent highway built by and named after Em-

peror Appius Claudius—namely, Via Appia—which ascended the Alban hills and ran across the Pontine marshes to Capua, where it divided into roads for Northern Italy and Europe. The second main road led to Reggio, and thence by ferry to Messina and the principal cities of Sicily, one of which, Capo di Boco, was the regular port of winter shipping for Carthage, in Africa. From Carthage roads of Roman construction led westward in communication with Spain and eastward to Asia. By a third road it was possible to reach Turkey, Macedonia, Illyria and Thrace, connecting with Athens and Antioch, which latter city was then the center of Eastern trade.

This magnificent system of skillfully constructed roads proved of immense advantage to the Romans in moving their armies with hitherto unexampled swiftness, the mails were transmitted at a much quicker rate, and trade with distant provinces received a great stimulus to renewed increase on a large scale. The speed of the Roman Government couriers in traversing these roads was much accelerated by the institution of relays, and the service was so well conducted that the average speed for long distance rides was increased to 100 miles per day. Much better speed was not infrequently made, but the conditions of the roads and the weather during the travel sometimes necessarily influenced the progress of the couriers a great deal. Thus, while Cæsar is credited with having covered his journey of 769 miles from Rome to the Rhône in eight days, it was not an unusual accomplishment for good couriers to speed from Antioch to Constantinople, a distance of 747 miles, in six days. Private letters were, as a rule, conveyed by good runners, making on the average 25 miles a day under favorable circumstances.

Historical accounts as to the further commercial development of the Roman State are wanting; in fact, the commercial and agricultural aspects of Roman life, which were the main pillars of Roman wealth, belong to the element of which we know exceedingly little. Ancient historians appear to have been so busy with chronicling the dates of wars and revolutions that they have omitted to leave a reliable account of internal affairs pertaining to the main industries. It is only here and there that we happen upon a few facts, jotted down as on the impulse of the native historians, which reveal that something of actual international commercial importance was going on most of the time.

#### The Silk Industry.

Thus we know that the silk industry, which was destined to become paramount in Italy, was promoted at the direct instance of the Emperor Justinian, and we know that this would rarely have occurred were it not for the excellent roads connecting the Roman Empire with the East. As Justinian reigned only as Byzantine Emperor, during the period 527 to 565, governing his provinces from the imperial seat in Constantinople, the art of silk spinning was not brought directly to Rome, but owing to the commercial interchange between the two metropoli the art finally found its way also to the Eternal City. Justinian ordered the silkworm of China introduced for the exclusive purpose of furnishing himself and his court with the envied garments of the Chinese, but if some commercial forum of the Rome before his time had taken up the matter it is likely that the business instinct of the emissaries would also have induced them to introduce in Rome the art of paper making and printing as conducted in China, whereby much valuable literature would have been saved. As it was, Justinian contented himself by dispatching two Persian monks to the land of the celestials, from which they returned with the eggs of the silkworm in a hollow cane. The eggs were hatched out in cow manure, the worms were set to spinning on the leaves of the Byzantine mulberry, and Justinian got the fine clothes of his choice. The opportunity to introduce the priceless art of printing on paper was not taken advantage of, and the Chinese kept the secret that, if revealed then to the Western world, would doubtless have changed many a page of history as we know it.

It is hardly necessary to extract additional historical evidence to emphasize the fact that the ancients recog-

nized the benefits accruing from commercial gatherings, and utilized the international character of the assemblies attending the fairs and the religious festivals for business purposes. Local events show that analogous conditions existed in a modified shape in Babylonia, in various cities of the Greek realm, and during the middle ages a similar commercial system was in evidence, now in one city, now in another, most prominent in the centers of greatest activity and business importance.

#### Nickel Steel for Armor Plate.

WASHINGTON, D. C., October 8, 1901.—In view of certain inaccurate and wholly misleading publications which have recently appeared concerning the settlement that has been made between the United States, the Carnegie Steel Company, Henri Schneider & Co. of Creusot, France, and the American Nickel Steel Company, in the long standing controversy regarding the right to use nickel steel in the manufacture of armor plate, the correspondent of *The Iron Age* has been furnished with the facts from an authoritative source. It will be seen that the settlement is more significant than a mere termination of a protracted dispute, inasmuch as the owners of the patents involved grant both to the Carnegie Steel Company and to the United States the right to use the processes covered by the patents to the full end of their terms. The consideration upon which the settlement is affected is the sum of \$130,000 paid by the United States to Schneider & Co.

The question at issue in this case was raised over a contract made in 1890 by the Carnegie Steel Company with the Secretary of the Navy to manufacture 6000 tons of armor, the contractors agreeing to employ nickel steel if required to do so by the Navy Department, with the proviso that if such requirement was made the Government would add to the agreed price of the armor the sum of 2 cents per pound to cover the claims of certain patentees claiming by their patents to control the right to make armor containing nickel steel. The Government stipulating that nickel steel should be used in the making of this armor, the Secretary of the Navy set apart a fund equal to 2 cents per pound on the amount covered by the contract in order to meet any liability for the use of the nickel steel process by the contractors. The Government declined, however, to pay this money to the contractors, although they were directly liable should an infringement suit be maintained against them.

Subsequently Schneider & Co. began a suit against the Carnegie Steel Company, charging infringement of certain patents, and a long and costly litigation ensued. The controversy was recently terminated by a series of conferences participated in by representatives of all contending interests, and an agreement has been signed of which the following are the principal points:

"Whereas, an amicable settlement has been agreed to, between the parties to said contract of November 20, 1890, and the owners of said patents, whereby both parties to that contract, their associates, agents and employees, shall be released from all claims or demands growing out of the manufacture, sale or use of nickel steel armor made by said Carnegie Steel Company and their predecessors in business, and whereby the said Carnegie Steel Company shall have the right to use the inventions covered by said patents in the manufacture of armor plate and appurtenances, and the Government of the United States shall have the right to use and to manufacture, or cause to be manufactured for its use, such armor plate and appurtenances, without further compensation to said patentees, to the full end of the terms for which said patents are or may be granted.

"And the said Schneider & Co. and the said American Nickel Steel Company hereby agree not to prosecute or cause to be prosecuted any officer or agent of the United States Government for any past or future manufacture, use or sale of said patented inventions, whether used in armor plate furnished by the said Carnegie Company, or by others; but this covenant not to sue shall not be construed in any manner to act as a license.

to any party or parties whomsoever to manufacture said armor plate except for the use of the Government, its officers or agents, without the permission of the owners of said Schneider patents, or to abridge in any manner the right of said Nickel Steel Company, or their assignees, to sue such parties for infringement of said patents.

"Now, therefore, in consideration of the sum of \$130,000 in hand, paid by the Government of the United States to said Schneider & Co., receipt whereof is hereby acknowledged, and for other valuable and sufficient considerations, the said Schneider & Co. and the said American Nickel Steel Company (a corporation organized under the laws of the State of Delaware, and having their principal office in Philadelphia, Pa.), to whom said patents were duly conveyed by assignment dated October 16, 1900, hereby release and discharge the Government of the United States and its officers, agents and employees, the said Carnegie Steel Company, and their predecessors in business and their and each of their officers, agents and employees, from all and every claim or demand by reason of the manufacture, delivery or use of nickel steel armor and appurtenances made and delivered by said Carnegie Steel Company and their predecessors in business, to the Government of the United States, and by reason of the manufacture, delivery or use of any and all nickel steel armor that may be hereafter manufactured and delivered by said Carnegie Steel Company, or their successors in business, to the Government of the United States, from the monopoly of all letters patent owned or controlled by the said Schneider & Co., or by the said American Nickel Steel Company, for the manufacture of nickel steel, or of any improvements therein, to the full end of the terms of said patents respectively.

"And the said Schneider & Co. further agree to assume and discharge the liability of the Government of the United States to said Carnegie Steel Company and their predecessors in business for the counsel fees and expenses incurred by them in defense of said litigation, as provided in said contract of November 20, 1890.

"And the said Carnegie Steel Company, in consideration of the release and discharge hereinbefore granted, hereby assent to the foregoing settlement, and release and discharge the Government of the United States from all liability, claim or demand, assumed or growing out of said contract of November 20, 1890."

It will be seen that under the license granted in the above agreement the United States may authorize any contractor for armor to use the nickel steel process without any further compensation to Schneider & Co. The patents referred to are two in number and were issued to Henri Schneider under date of November 18, 1889, and therefore have five years to run. W. L. C.

**A Car Wheel Plant at Pittsburgh.**—Charles T. Schoen, chairman of the Board of Directors of the Pressed Steel Car Company of Pittsburgh, has about completed plans for the building of a large plant in that city for the manufacture of car wheels. For two or three years Mr. Schoen has made a study of the problem of a proper wheel for heavy freight cars that would combine economy and safety. The result of his investigations has led Mr. Schoen to decide to build a plant to make solid rolled steel wheels. Special machinery will have to be constructed for this purpose, and it will be some months before the plant can be completed. Mr. Schoen, with his associates, has secured a site of 28 acres near Pittsburgh, which will be used for the new works. Engineers in Philadelphia are now drawing plans for the new plant and active work is expected to be started in a short time.

**The Plow Consolidation.**—Announcements have frequently been made without authority that the proposed consolidation of plow manufacturers has been accomplished. Another of these announcements appeared in the daily press last week. The promoters have gone so far as to select the name, and, if formed, the company will be known as the American Plow Company. Meet-

ings of those interested have been held in Chicago the past week, and a committee was appointed to continue the work of inducing manufacturers to join the movement. It is claimed by opponents of the consolidation that several very important plow manufacturers will not do so except at a price which seems to be prohibitory.

### Western Engineers' Outing.

The Western Society of Engineers and their families enjoyed an outing on the 5th inst. The Chicago, Burlington & Quincy Railroad Company tendered the society a special train for a trip over the scenic part of their lines in Northern Illinois. The route arranged was from Chicago, by way of Aurora and Ottawa, to Streator, then through La Salle and Spring Valley to Zearing, returning on the main line to Chicago. The excursion thus covered a portion of the northern coal fields of Illinois, and comprised a pleasing variety of fertile prairies and broken country. Leaving Chicago at 9:15 a.m., the party arrived at Deer Park, near La Salle, in time for lunch, which was partaken of in one of the park buildings. This park is the private enterprise of Mr. Matthiessen of the Matthiessen & Hegeler Zinc Company, La Salle, but is open to the public under some restrictions. It comprises a large tract of land, consisting of bold eminences and deep ravines, having great natural beauty, now being embellished under the direction of L. A. Nichols of Chicago. A special feature of the park is a picturesque cañon, some 100 feet deep, which is a strong reminder of the cañons of Colorado and New Mexico, although on a much smaller scale.

On the homeward trip in the afternoon a visit was paid to the new mine, No. 5, of the Spring Valley Coal Company. The buildings and hoisting equipment at this mine have just been completed. The mine buildings are of steel, constructed by the American Bridge Company. The hoisting engine was built by the M. C. Bullock Mfg. Company of Chicago. A double compartment vertical shaft, 420 feet deep, is used for bringing the coal to the surface from the seam, which is 3½ feet thick. The company expect to hoist 500 tons a day from this opening. The coal mined here is largely used in and about Chicago for steam raising. A rapid run was then made to Chicago, which was reached at 7 p.m. The arrangements for the excursion were made by the Entertainment Committee of the society, consisting of G. A. M. Liljencrantz, Granville Kimball and Albert Reichmann, assisted by Geo. P. Nichols and J. H. Warder, secretary. L. A. Nichols, engineer of Deer Park, and Lieutenant Blow, son-in-law of Mr. Matthiessen and one of the survivors of the "Maine," rendered much service to the society in arranging for the visit to the park. The party numbered over 200 persons, filling five cars.

### The Drawback on Box Straps.

The Treasury Department has issued the following decision: On the exportation of the Universal box strap manufactured by the Cary Mfg. Company of New York City, with the use of sheet steel wholly imported, paying duty under paragraph 131 of the existing tariff, the sheets as imported having been cut into strips of required widths, riveted with domestic rivets, embossed and wound into coils of uniform length, a drawback will be allowed equal in amount to the duty paid on the imported material used, less the legal deduction of 1 per cent.

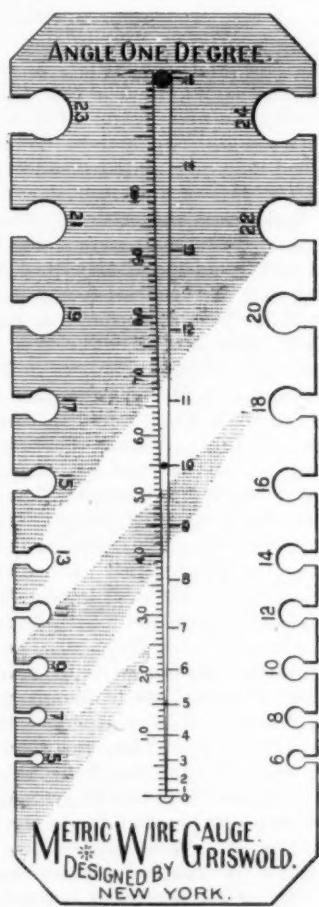
In the liquidation of entries the weights of sheet steel as imported which may be taken as bases for allowance of drawback may equal the net weights for each size and gauge of coil, as declared in the drawback entry after official verification, provided that in no case shall such weights exceed those set forth for coils of corresponding size and gauge in the manufacturers' sworn statement hereinbefore mentioned. Samples of the steel in the exported straps may be taken, or sworn samples furnished, as ordered by the collector, for required determinations.

### Railroad Statistics for 1900.

The "Introduction to Poor's Manual for 1901," which has just been issued as a separate pamphlet, contains a large amount of instructive matter relating to the railroads in this country. The total railway mileage of the United States on December 31, 1900, was 194,321. The net increase in mileage for the calendar year 1900 was 3505 miles. The aggregate assets of the railroads of the United States (so far as reports have been made) amount to \$12,862,491,243, an increase in the last year of a little more than \$300,000,000.

The total gross earnings of these roads in 1900 were \$12,784,372,860, an increase over the preceding year of about \$314,000,000. The aggregate capital of all the railroads reporting was, on December 31, 1900, \$5,804,346,250, and the aggregate funded indebtedness was \$5,758,592,754.

Sixty of the principal railroad systems in this country, according to Poor's Manual, controlled in 1900 62.8



SKETCH OF THE GRISWOLD METRIC WIRE GAUGE.

per cent. of all the railway lines in operation here. Of the total number of passengers carried by all of the railroads in the United States in 1900 (584,695,935) these 60 systems carried 442,382,459, or 75.6 per cent. of the whole number, the total distance traveled by passengers on the 60 systems being 12,936,472,872 miles at an average charge of 1.903 cents per passenger per mile, against a general average of all the roads in the Union of 2.031 cents. Of freight tonnage the companies included hauled 685,908,701 tons, being 64 per cent. of the total tonnage (1,071,431,919) of all the lines in the country. Their aggregate haulage equaled 111,419,695,803 tons 1 mile, being 79 per cent. of the grand total, while the average charge per ton per mile was 0.713 cent, or 0.033 cent less than the general average for the whole country.

The Manual says: "In 1890 the total of stock and bonds of 65 systems was \$5,209,431,474; in 1895 the total investment increased to \$5,995,374,698, the number of systems being, in that year, 61, and in 1898, for the same number of companies, the total reached \$6,454,864,171. In 1898 the total stock and bond investments reached the enormous aggregate of \$6,550,049,103, only to be

still further increased to \$7,069,842,726. While the returns on capital invested in the companies' bonds show comparative steadiness—being 4.66 per cent. in 1890; 4.72 in 1891; 4.83 in 1892; 4.71 in 1893; 4.70 in 1894; 4.52 in 1895; 4.69 in 1896; 4.68 in 1897; 4.49 in 1898; 4.54 in 1899, and 4.33 in 1900—the returns on money invested in stock show a fluctuating but declining tendency from 2.39 per cent. in 1893 to 1.62 per cent. in 1896, advancing to 1.86 per cent. in 1898, and, because of exceptional prosperity, to 2.27 per cent. in 1899 and 2.80 per cent. in 1900."

The number of tons of freight moved by all of the railroads in this country during the fiscal year 1900 aggregated 141,162,109,413. Operating expenses generally have increased.

### Lead Coating Cast Iron.

The process in common use for producing a coating of lead enamel on articles made in cast iron is to sift the powdered salt of lead, employed as a glaze, by hand onto the cast iron to which it is to be applied, which must have been previously heated to bright redness. This plan, which gives excellent results, is fraught with serious consequences to the health of the workmen, and in spite of the use by them of respirators and nose guards it speedily brings on ailments of a most distressing character, caused by the inhalation of the fine particles of lead floating in the atmosphere of the workshops. The consequent lead poisoning is not alone due to respiration, but the dust also enters the pores of the skin, and in a few years the bulk of the work people engaged in this industry succumb to the ravages of this terrible poison. An account is given by Georges Caye in *La Nature* of a process for applying a coating of lead enamel to iron surfaces by mechanical means, invented by A. Dormoy, the manager of the works at Sougland, in the Department of Aisne, France, in which danger of injury to the health of the work people is avoided. The articles to be coated, after being heated to redness, are placed in a double hermetically sealed chamber with glazed sides; each half of the chamber can be worked alternately, and the surplus enamel powder, dusted over the metal by means of a sieve, is removed from the chamber by the draft from a high chimney. The necessary movements of the iron can be effected from the outside of the chamber, and the vibration of the sieves for the purpose of distributing the lead powder is provided for by an electrical beater. The various methods of introducing and rotating the object to be enameled, operated from the exterior of the chamber, are fully described, and it is stated that the new process has proved extremely successful in working and entirely does away with all risk of ill effects to the work people engaged.

### The Griswold Proposed Metric Wire Gauge.

The accompanying sketch shows a wire gauge proposed by M. W. Griswold of New York. The center division represents 1-360th part of a circle, and has one of its sides divided to represent millimeters and the other marked with the gauge numbers. Commencing with the center of the circle as No. 0, each number increases respectively 1 millimeter as roughly drawn. This division, beginning with No. 0, ends with No. 15. The marginal slots extend from No. 5 to 24. The former is intended to illustrate the principle upon which the gauge depends, and the latter the most practical form of manufacturing it.

One result of the ending of the strike in the sheet, hoop and tin plate mills has been that the members of the International Protective Association of Tin Workers have decided to work up black plate in the nonunion mills of the American Tin Plate Company. It will be recalled that this class of labor coat the plates and are not eligible to membership in the Amalgamated Association, but have an organization of their own. The fact that these men will work black plates rolled in nonunion mills will probably lead to a complete severance of all relations between the two organizations.

## The Monessen System.

### The Donner Process of Rolling Black Plate.

When the negotiations for the scale between the Amalgamated Association and the American Tin Plate Company were concluded the Monessen plant was excluded because a special method of rolling black plate was in operation there. An admirable description of the system in question is given in a recent issue of *Tin and Terne*, from which we reproduce the following, the system having been introduced at the Monessen works early in 1898:

The system was put in operation, and the first patent issued, before the formation of the American Tin Plate Company. W. H. Donner, the patentee, made an agreement with the company by which a thorough trial of the economies should be made, extending over a period of three years, to determine the basis of compensation. This time has now nearly expired. The patent is No. 615,535, dated December 6, 1898. There seems to be no question that the American Tin Plate Company enjoy an important advantage over competitors through the possession of the system.

In the rolling of tin plate two methods only have heretofore been used, with the separate roughing stand, and without it. With the single stand, the roughing has a greater heating effect than any of the other operations, and the result is that at the close of the roughing the rolls have been unduly heated, while the heat goes down more or less irregularly while the pairs, fours and eights are being rolled. It is difficult to keep the rolls up during the rolling of the eights. Besides this general heat change, which constitutes a complete cycle with each heat, there are minor variations owing to the "rests" which are introduced more or less irregularly in the effort to keep the rolls of the right contour. The rolls are continually seesawing above and below the average temperature. As the rolls are being puffed the outside is hotter than the inside; as they are approaching the hollow condition the outside is cooler than the inside. When the separate roughing stand is used the finishing stand remains wholly idle during the roughing, while the roughing stand is wholly idle for long periods at a time.

It is plain that if the rolls were doing absolutely uniform work their temperature would remain uniform. How is this to be done? There has been a popular superstition that the work must all be done on the same pair of rolls. In support of this position it is argued that the passes must all be of the same contour, and it is held that since there is considerable variation in the contour even with the same pair of rolls, there would be still more with different pairs of rolls. This is a wholly erroneous conclusion, because the variations in contour in the single pair of rolls are due simply to the fact that the work is done all with one pair. It matters not how many successive pairs of rolls are used, provided they are turned to suit the temperature and the temperature is kept uniform. All the passes will then be similar.

#### A Five-Stand Unit.

The inventor argued that the ideal condition would be the passage through a given stand of rolls of packs having all the same length and temperature, the passes occurring at absolutely regular intervals. Then the rolls would remain at exactly the same temperature, so that the contour would be the same at all times and there would be no danger of breakage from differences of temperature between the inside and outside portions of the roll, and from this was evolved the new system, which attains the desired result. The simplest case involves the use of either four or five stands of rolls as a unit, five being preferable. The conditions at Monessen have been such, there being but six completed mills, that this arrangement could not be conveniently worked, and so another plan, involving the same principles, has been used, but it will be well to describe first the system as it would be practiced in case five stands of rolls constituted a unit. In this case, the first two stands

will do all the roughing, on the third stand the pairs will be rolled, on the fourth the fours, and on the fifth the eights. The roughing is divided between two pairs of rolls because the duty is so much more severe. The work is continuous with each stand, and here is the novel point which forms the basis of the patent. There will always be more than one series of bars being rolled at a time. In the usual practice the last pack of eights is done before the first pair of bars is roughed. There is but one series of bars or packs being rolled at a time. With the plan outlined there will be four series of bars or packs being worked at any given time. The basis of the patent is that there is a plurality of series of bars under treatment all the time, and in no other way can the rolls be made to receive the regular heat treatment to which reference has been made, so that they will remain always of the same contour and will not vary in temperature.

#### The Ideal Operation.

The operation would be as follows: A heat of bars is put into one of the two furnaces standing opposite the first two stands of rolls. When they are hot the bars are withdrawn and roughed. A few will be roughed on the first stand, then a few on the second stand, then back to the first again, so as to divide the work evenly between the two stands. When two bars have been roughed they are matched, and the pair put into the first of the pair of furnaces opposite the third stand of rolls. Meanwhile the other of the pair of furnaces opposite the two roughing stands is being charged with bars. The first operation ends with a heat of bars in one of the first pair of furnaces, ready to be roughed, while the other of the pair of furnaces is ready for the third heat of bars to be started. The first of the pair of furnaces opposite the third stand of rolls is full of pairs ready to be rolled. The next operation is to roll these pairs, putting them back, doubled, into a furnace of the next pair. During this time the second heat of bars is being roughed, and the third heat charged. The next operation is to roll the fours on the fourth stand of rolls, putting them back, doubled, into a furnace of the last pair, while at the same time the second series (in the shape of pairs) is being rolled on the third stand, and the third series (in the shape of bars) is being rolled on the first two stands, while the fourth series (the cold bars) is being charged into the furnace. The next operation, which completes the chain, is to finish the first series (in the form of eights) while the second series is being rolled and doubled into eights, the third series is being rolled and doubled into fours, the fourth series is being rolled and matched, and the fifth series is being charged into the furnace. The whole system is now in operation, and subsequent practice is simply to keep up the work in a regular and orderly manner, new heats of bars being continuously charged. Every time a new heat is charged each of the preceding heats is advanced one step. The work is kept up continuously, and each stand of rolls is always doing the same work. Each pair of rolls is turned for the exact work it is to do, and the passes are therefore all parallel at all times. In any of the pairs of furnaces, one of them will be continuously receiving cold packs while the other is supplying hot packs during the period, while in the next period their relative positions will be reversed, and so on.

A very important feature of the practice just referred to is that, as the packs are taken from the furnace and rolled, they are not put back into the same furnace, but into another furnace. In the ordinary practice the packs are put back cold into the furnace from which hot packs are being withdrawn, with the effect that portions of the hot packs are liable to be chilled, and will therefore roll irregularly. To avoid this as much as possible great skill is required on the part of the heater, which can now be done away with. Then again, each roller or catcher will always be handling either bars, pairs, fours or eights, and will acquire special skill in his one particular branch. A workman can roll eights better if he rolls nothing else. Between the third and fourth stands is stationed a doubler with his doubling shear, and another between the fourth and fifth stands. The first named will be doubling fours all the time.

The second will be doubling eights all the time. Each will be a better workman, other conditions being equal, than if he doubles fours for a while, then doubles eights, and then helps at the furnace.

#### **The Monessen Method.**

As has been explained, the conditions have been such at Monessen that the system just described would be inconvenient, because there are but six mills entirely completed. It has been explained at such length because it shows most clearly the principle, and produces absolutely the result of maintaining at all times the same temperature in a given stand of rolls. It has been found that even a partial application of the new principle fully meets all requirements, and the six mills at Monessen have therefore been divided into three pairs, each pair constituting a unit, separate and distinct from the others. On the first mill the bars and pairs are rolled, and on the second mill the fours and eights. Thus the first stand is rolling bars and pairs alternately, and the second mill fours and eights alternately. It is found that the variation in the work is not in this case sufficient to seriously disturb the temperature or contour of the rolls. The writer has carefully inspected the working of the plant on this principle. Between the two mills is placed a doubling shear with a doubler. He is kept doubling heats of fours and eights alternately.

#### **Advantages and Results.**

The rolls being turned exactly for the work they are to do, and being kept at practically the same temperature, the ends of the finished packs are wholly without horns or rounded ends. The scrap is very materially reduced at the doubling shear and at the squaring shear. The edges of the packs are straight and even. The surface of the sheets is excellent. As the men are doing practically the same work continuously, they acquire a greater skill than is usual. But few of the men working at Monessen have had any previous experience in a tin mill. The bulk are men who have been trained to do the work, and they have made excellent workmen, as was evidenced to the writer by the excellent quality of the work turned out and the ease with which they were turning out the product, which was averaging over 14,000 pounds per turn for each double crew. The blackboard showed turns considerably exceeding 14,000 pounds for a pair of mills, during the week, but the inventor seemed desirous of apologizing for the outputs, and it seemed evident that the men if pushed could turn out very much more, possibly as high as 20,000 pounds for a pair of mills, when rolling packs 28 x 60. It is certainly remarkable how quickly the men at Monessen have learned to do their work. They handle the tongs with the ease and confidence of veterans in the business. They are paid wages which are eminently satisfactory to them, yet the tonnage cost of their labor is considerably less than it is in other mills. Their high earnings are due mainly to the steady operation of the mills throughout the turn, by which a very large output is secured without special effort.

Only one roll has been broken at Monessen since the present run began, last February, and that roll had a defective neck. Only two coupling boxes have been broken in the past six months.

The reduction in scrap and the regularity of the doubling work at Monessen has in considerable measure been due to the use of a peculiar form of doubling shear, the invention of Frank Donner, a brother of W. H. Donner. The shear was patented some time ago. It is so similar to the ordinary doubling shear that a workman who has been accustomed to the use of the ordinary doubling shear can change to it without experiencing any feeling of awkwardness, the only difference being that the portion of the table opposite the knives is depressed  $\frac{1}{2}$  inch or so below the balance of the table, forming an edge which is exactly at a right angle to the knives. In shearing off the end of the pack, the doubler shoves the pack against this edge, and the end of the pack is in consequence sheared off at an exact right angle. The presence of a guide for this work, extending above the general surface of the table, would be objectionable.

A peculiar effect of the steady and regular temperature of the rolls is seen in the behavior of the bearings of the rolls. To secure good lubrication it is of course necessary that there should be the most accurate fit between the brass and the neck of the roll. This fit will come by wear, provided the neck remains of the same shape. If the roll varies in temperature the shape of the neck will also vary. At Monessen the practice keeps the necks of the same contour continuously, and the wear of the brasses is much below the average, while the consumption of grease is reduced to less than one-half. The perfect fit between brass and neck makes the bearing run cool.

It has been found that the rolls will maintain a good surface for two weeks, and in fact seem less liable to deterioration than when used with the regular system and with the ordinary output.

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#### **Pacific Coast News.**

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SAN FRANCISCO, CAL., September 30, 1901.—The strike is almost the sole topic, and I am happy to say that at least one strike is drawing to a close. I mean the machinists' strike. Both parties have been claiming gains and losses, and a great many men have been brought from the East, some of whom have deserted on their arrival. But the number at work has been gradually increasing. Somewhat over a week ago many machinists and other workmen went back to some of the smaller shops. It was claimed that they went back at the nine-hour day and satisfactory wages. But I am informed on good authority that they have come back on the same terms as before the strike—ten hours' work and ten hours' pay. Of course, there were some small shops working right along at nine hours' work and ten hours' pay. This will last till the strike has terminated. The Union Iron Works have now 1600 men at work, some from the East, some belonging to California and some striking workers who have gone back. The Risdon have 1000 workers. The other foundries and machine shops have a few hundred more. Mr. Dodd, the manager of the Union Iron Works, says: "They are coming out, one by one—20 men have just gone back to one foundry. The strike is broken, the men are returning quietly to work. It is my opinion that you will see the last of the strike by the end of the week." Others were not so sanguine. At the National Iron Works the manager said that his men had reported for work this morning, but that he could not employ them all—leaving the inference that he would put them on according as he could. He said it was the same with Evans & Co., the Cyclops and one other shop, the name of which he could not remember. The men at the National went out very unwillingly and were wanting the union all the time to let them go back to work. There were in all 100 of them, and as they could not be all put on to-day, it is as in other cases—they waited too long. And as this is doubtless the end, the net result is a loss of \$365 to every striker receiving \$3.50 a day.

The teamsters', porters', and packers' and water front strike is reaching an acute stage. Encounters between the strikers and the special police and nonunion men are of almost daily occurrence and there have been some fatal cases. The number of nonunion men at work is increasing daily, and clearances of vessels are becoming as numerous as before the strike. The wheat and barley stored at Port Costa and elsewhere is beginning to move off in very lively fashion.

The Clearing House charges still keep ahead of those of last year, and though the strike is felt in many quarters, it has evidently not done as much harm as many suppose. The export trade of the port, exclusive of Hawaii, has risen again to \$800,000 to \$1,000,000 a week. The movement in hardware, machinery, pipe, &c., is just as free as it has ever been, especially to the Hawaiian Islands. It is also large to Mexico and Central America, moderately so to China, Japan and Australia, but though we have two lines of steamers down to the west coast of South America, very little machinery or hardware has found its way from San Francisco in that direction as yet. While on this point, it is as well to say

that the proposition of the President to favor steam communication between Eastern ports and the west coast of South America is likely to give rise to some comment, as there does not seem to be any reason why steam communication between the Pacific Coast of the United States and those countries should not first receive encouragement. Business in hardware, agricultural implements, &c., is fairly good, everything considered, and if the series of strikes should cease would be excellent.

J. O. L.

### Lake Iron Ore Matters.

DULUTH, MINN., October 5, 1901.—In little over a month the largest shipper of ore down the lakes will be practically through the season's business. Already the schedule of shipments of many grades and for some mines is reduced to a very small percentage, though there is a large volume of ore yet to move under these schedules. It is quite possible that a change may be made in the totals, and a larger amount of ore sent down than was expected; arrangements looking to this end are now under consideration. The furnaces think they will need more ore than was expected. Iron ore shipments after November 15 are expensive and difficult, and it is the hope of the managers of this interest that the tonnage to be moved will be pretty well out of the way by that time. Many other shippers will be less fortunate, and the volume of ore carried forward during November will be large. Rates are advancing, in spite of the fact that the United States Steel Corporation and some other heavy ore shippers are for the present out of the market for wild tonnage, for the wheat movement is setting in very heavily and coal to be carried up the lakes is still in great quantity. There were 11,350,000 bushels of wheat alone received at Duluth during the month of September, and shipments during the fall months will be correspondingly large.

#### Big Shippers.

Indications are that the same mines that last year exceeded 1,000,000 tons in their shipment, the Fayal and Mountain mines of the Mesaba range, will be the only ones to pass that mark this year. The Fayal has already exceeded its last year's total of 1,252,000 tons, and has more than a month ahead of it. The Mountain Iron will exceed 1,000,000 tons before the close of the season. The Chapin, on the Menominee range, will not touch seven figures, though it will come close to it, closer than the Norrie, and both will be above 900,000 tons. The Mahoning will ship about 800,000, the Stevenson about 750,000 tons, which will be one of the most remarkable achievements in mining, for the property was opened but about a year ago and the stripping contract that permitted such a record was started in September, 1900. The Adams and Spruce mines, which are now operated co-ordinately, will come close to 1,000,000 tons, each of them putting out more ore than last year, although it has been reported around the mines that the Adams was falling behind this season. The Lake Superior mine of the Marquette range and the Pioneer of the Vermillion will make about the same total. The Pioneer will exceed its last year's figures of 450,000 tons by 200,000 tons, making it the largest shipper in the lake region from out of a single shaft. The Biwabik will be far under its 925,000 tons total of last year, and will be little ahead of the Tilden of the Gogebic. The Regent mines, Negaunee, will ship about the same as last year, when the total was 398,000 tons. The Crystal Falls mines, as a whole, will be considerably above any preceding year. The mines of the Cleveland Cliffs Company, that last year exceeded 1,000,000 tons, will fall far below that this season, though the addition of Ashland, Gogebic range, will bring the company's total pretty well up. The Aragon of the Menominee range has been shipping heavily and will maintain a better than 400,000 tons record, while the Pewable will fall below. These are the larger mines of the region, producing the bulk of the output.

Shipments from Minnesota for September were 1,412,000 gross tons, making a total from the State for the season to October 1 of 8,192,000 tons, or 464,000 tons in

excess of the preceding year to the same period, which is the more notable as shipment commenced this year a full month later than in 1900. In the month the Duluth & Iron Range road led all ports on the lake, with a shipment of 740,611 tons, and its port, Two Harbors, will this year carry off the palm for volume of traffic with about 4,400,000 tons. A year ago Duluth led.

On the Marquette range the Cleveland Cliffs Company have abandoned Michigamme mine, after making considerable preparations to mine and sending up 50,000 tons of ore. The expense of mining there has proved unexpectedly heavy. The machinery will be moved to Negaunee and the mine will be allowed to fill. The company are soon to be hard at work sinking shafts in their new Negaunee locations, and as there is a heavy thickness of quicksand and probably much water above the ledge it may take some time to get these shafts down, and no ore will be mined before 1903. It has been ascertained that there is a good body of ore there. Five drills were at work on the location much of the season, and two are still busy there.

A remarkable record has been made at the Negaunee mine, which is now hoisting more ore than at any time in its history and will close the season with a total of 250,000 tons. During this year the shaft caved, the mine was flooded and then settled so badly that the engine house was ruined and the machinery had to be moved instanter. The mine is employing 400 men, and may increase this number.

It is expected that the ore movement on the Lake Superior & Ishpeming road will continue, in some volume at least, through the winter, and that a large amount of ore will be stocked near the docks at Presque Isle before spring. This will be an innovation in lake railway business, and will be watched with some interest, though it is not probable that any other roads will follow the example. This road is now making a survey to the Negaunee locations of the Cleveland Cliffs Company.

A great change is being made at the Section 21 mine of the Lake Superior Iron Company (United States Steel) by the installation of new and heavier machinery. Fifteen-ton balanced skips will replace the old 2-ton cars, and the entire shaft, 760 feet deep, will have to be rerailed.

Ore has been struck in the old Erie mine, under option to E. F. Bradt, but nothing is yet known of the quantity and little of the grade. On the Menominee range the Chapin is being improved and made ready for an annual output of about 1,000,000 tons, which it can probably maintain for many years. The Chapin has shipped more than 10,000,000 tons since it was opened.

Nothing is being done at the Riverton property, on which the Oliver Company have spent considerable money in preparation. Perhaps nothing will be done until the problem of changing the course of Iron River is solved satisfactorily and carried through.

It is locally reported that the Clergue interests at the Sault are looking for Menominee ore to mix with their own Canadian product, but there is no confirmation of the rumors.

The Monongahela of Jones & Laughlins will ship about 10,000 tons this year and will be vigorously explored during the winter. Neither the Gibson nor the Michigan mines will ship any ore this year, though the latter is hoisting 200 tons daily.

The Armenia and Tobin mines of Corrigan, McKinney & Co. are producing. The Armenia is showing up very well indeed, and it is probable that the old Dunn, on which nothing has been done for a year, will be taken hold of again by these operators and the shaft sunk to 800 feet. It was dropped last year at 140 feet down.

On the Mesaba range interests connected with the Republic Iron & Steel Company have taken lands adjoining the McKinley mine and the mineral rights of the town site of McKinley and will explore at once. The town site of Chisholm is also being explored for ore by a couple of men who have paid advance royalties of \$12,000. They have not found any ore and most mining men will be greatly surprised if they do.

Considerable exploration is going on in T 59 R 15, and in the northern part of T 58 R 15, and some ore is being found there. C. A. Congdon is exploring a large tract of

land in sections 26 and 27, T 58 R 20, and J. B. Adams, who is exploring in section 27, reports the finding of a considerable body of ore. Mr. Congdon will probably re-explore the Monroe mine, which he secured some time ago by purchase of the lease. He also has the northwest 40 in section 27, and has found some ore there. The exploration in T 56 R 23 is showing a grade of ore better than formerly found. It is again reported the old Buckeye exploration in T 56 R 24 is to be reopened and tested.

A single contracting firm will, by the close of the year, have removed about 1,300,000 cubic yards of earth, &c., from over the ore at the Fayal, Stevenson, Sharon and Auburn mines during the present season. D. E. W.

## The Development of the Pig Casting Machine.—I.

BY A. E. FAY.

The improvements which have been made in blast furnace practice during the past quarter of a century have, as everybody knows, been exceedingly important.

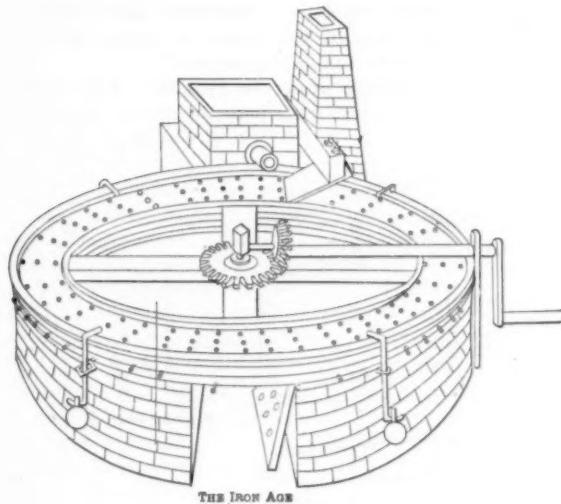


Fig. 1.

### THE PETTIBONE PIG CASTING MACHINE.

In 1875 Sir I. Lowthian Bell stated to the Iron and Steel Institute, in a report on his investigations in America: "It is quite true that at some of our English establishments in the Lancashire district a furnace has been known to give 700 tons in one week, but this does not represent by more than 200 tons the usual rate of driving, whereas 600 and above is the average production at the Isabella and Lucy works." Although the make of most blast furnaces in Pennsylvania was only 200 to 300 tons per week at that time, it may be noted that America was already being heard from in the matter of speed. Since that time progress has continually been made, especially in this country, until the general average daily output has approached 300 tons per stack, and furnaces are now in operation whose daily capacity is above 700 tons.

Up to within a very few years, however, the facilities for casting and handling the product of the blast furnace have not kept pace with the improvements in the furnace itself. The pigs had been almost universally cast in sand beds, which entailed an immense amount of the most arduous and difficult labor in breaking the pigs from the sows and loading and removing them. As Mr. Uehling has said, "The task of carrying pig iron is one not fit for human beings. The extraordinary exertion which is required excludes four-fifths of the laboring class from standing up under the strain, and the necessity of passing back and forth between the heat and steam in the cast houses and the chilly air outside is enough to kill the stoutest." This labor is also very ex-

pensive, troublesome and hard to keep at work steadily.

The continuously operating casting machine was not prematurely produced. When it arrived upon the scene everything was ready for it and waiting. It had been wanted for several years, and as soon as its practicability was demonstrated it was rapidly adopted. Although it was only five years ago when the first Uehling machine was put to work, it was authoritatively stated in 1898 that 50 per cent. of the American pig iron output was being cast on casting machines. The value of the new machine has been amply demonstrated, and it is evident that its development has been one of the most important steps made in steel manufacturing during the past decade.

Aside from the mechanical advantages in using these machines, their product is superior to that of the old method. Although I do not wish to enter the sandless pig controversy, it may be well to note that against the many points of superiority demonstrated for sandless pig only one important argument has been brought—namely, that the fracture is misleading. This question, however, seems largely one of custom, and it seems that foundrymen will have to get used to machine cast pig and its fracture. It now appears to be preferred in Bessemer works, and is used exclusively in basic open hearth plants here. The fact that so much of the iron and steel business is carried on by very large concerns has helped the adoption of these machines, and now the latest giant consolidation will be sure to cause these and other labor and time saving devices to be much more extensively used.

Most of these matters have before appeared in print and have been extensively read and commented upon. The history of the development of this important invention, however, has never been carefully considered.

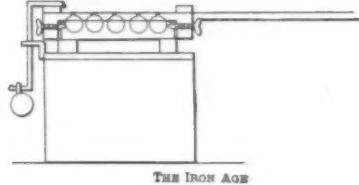


Fig. 2.

Every article that has been published has, I believe, had for its only object the exploitation of some particular make of machine. None has compared the different makes in any way except to show that the one under consideration was superior to all others, and none has hinted or admitted that any of the ideas employed were old. It will be the purpose of this paper to present these matters to show who conceived the fundamental ideas of the modern machines of all kinds and who first put them into practical operation, to trace the development of the continuously operating casting machine from its beginnings, to describe the latest improvements and discoveries, and to compare the different types without prejudice. Those matters which have been so fully discussed and the controversies which have arisen will not be threshed over again here, however.

Three kinds of these machines have been proposed—1, the vertical disk; 2, the horizontal disk or turntable; 3, the endless chain. The first of these can be of no possible use in blast furnace practice as it now exists, but has been proposed for some other purposes. The second is represented in practice by the Davles and Hartman machines, and the third by the well-known Uehling, Patterson and Acklin machines. Each of these types will be taken up separately and more fully described.

#### The Vertical Disk Machine.

In this machine a large disk was provided, with molds on or near its periphery, and was mounted to revolve on a horizontal shaft. The metal was generally

fed to the molds just before they reached their uppermost position, and they discharged the castings when they came around to the bottom. Obviously such a device could not be used advantageously for casting pigs, for in order to give them a chance to set sufficiently to avoid bleeding a machine half the size of the Ferris wheel would have to be constructed, or else its speed would have to be reduced so much as to deprive it of one of its chief advantages. This type of casting machine was, however, at one time favorably considered by some for certain kinds of work, and even Sir Henry Bessemer tried to use it for casting ingots, so it seems worthy of a passing notice.

It was first suggested in 1855 by Hezekiah Conant of Hartford, Conn., for casting lead shot or slugs. His machine was very simple, the molds being covered by a stationary band and the metal being poured continuously as the disk revolved. This machine was "improved" by E. Nugent in 1859 by the addition of several complications and by Long in 1866. About this time J. M. Osgood reconstructed it for making eyelets and Holt employed it for casting lead seals. These machines were provided with movable cores and mold parts,

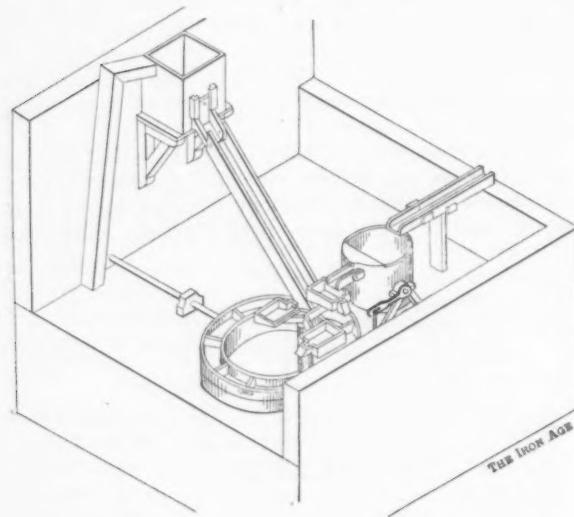


Fig. 3.

## THE BLAIR CASTING MACHINE.

which acted automatically to eject the castings, and some of them had sprue cutting chisels.

John J. C. Smith, then president of the Metallic Compression Casting Company of Boston, took up this idea in 1869, when engaged in developing the Smith casting process for refractory metals. His molds opened with a shock to loosen the castings and also had an ejector. The metal was compressed by a piston, and the molds could be water cooled and exhausted of air before being filled.

Another use for the vertical disk machine was the casting of slag, which was tried in practice with some success by D. Joy in Great Britain in 1871. The pans or molds were placed either on the outside or inside of the rim of the wheel. Bessemer's machine, invented in 1880, was the only one of this type which was designed for casting ingots. The molds were situated in pairs on the periphery of the disk, which was rotated by a step by step motion. Several such machines have since been designed, but they could not be used for large work and have not shown any particular advantage for small. The latest and most ingenious of these machines has recently been patented by Rudolph M. Hunter for casting electric fuses.

## The Turntable Machine.

In this type of casting machine the molds are mounted on a horizontal disk, table or skeleton frame, rotating on central bearings; the metal is poured con-

tinuously or intermittently, and some means are provided for discharging the castings from the molds at a desired point. There are two varieties, those producing pigs in open topped molds, and those making castings in closed molds, usually made in two sections. In the former the molds are overturned, and in the latter the sections are separated to discharge the castings.

This is the most ancient type of casting machine, and although it was not perfected as early as the endless chain type, it is now being rapidly developed and bids fair to compete successfully with it. Its history is quite interesting, as it extends back nearly a century and a half, and as the machine has on several occasions in the past seemed about to reach a point where it could be put into successful practical operation.

The first casting machine of this or any other type was invented by "Robert Morris of Glamorgan, Esquire," in the reign of George II. All we know of it is contained in his patent granted in 1757 for a "Method of Fashioning and Coloring Copper in Imitation of Japan Copper," in which it is described as follows: "The copper is run from the furnace into small molds, which are fixed in a machine that keeps them moving in a horizontal circle under water, the water being so tempered by a proper degree of heat as not to subject the fluid copper to explosion, and when it is set, or become solid in the water, it comes out a fine vermilion color, like the Japan copper."

The next recorded effort in this line was made in this country by Daniel Pettibone in 1819. He contem-

Fig. 6.

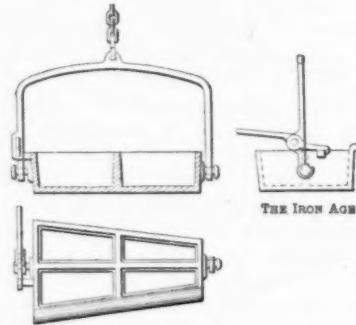


Fig. 4.

## THE BURDEN CASTING MACHINE.

plated using his machine for casting balls and shot of lead or iron, printers' type, nails, rivets, buttons, &c. As shown in Figs. 1 and 2, it consisted of a brass wheel 2 feet in diameter, with a rim 3 inches wide, provided with molds. The molds opened to discharge the castings by the dropping down of the pivoted plate forming the bottom of several molds, as shown at the front of Fig. 1. The metal was poured continuously, and a stationary cutter, S, was provided to cut off the sprues, which were formed in grooves on the top. The molds were coated with sulphur before pouring. This machine was improved by Alfred Duvall of Baltimore in 1838. Most of his improvements related to the treatment of the shot after it was cast, but he first suggested the use of a hammer for striking the molds to discharge the castings that did not readily drop out, and also the use of a water bath to cool the molds after the castings were discharged, Morris' molds apparently being under water all the time. The pivoted hammer was raised by pins, cogs or other projections on the surface of a roller turned by the revolving wheel.

The fourth machine that belongs in this class was of very different character, being designed for making such large castings as railway chairs. It was merely a flat circular table on which 30 or more metal molds were placed, and was provided with holes, through which the castings could fall when the molds were overturned. It was apparently operated entirely by hand. The metal was run to the stationary ladle directly from

the smelting furnace. It was invented by William Darling of Glasgow in 1847.

In 1859 Dr. Wm. Henry Smith of Philadelphia, who had previously been associated with Bessemer in obtaining patents in England on the manufacture and treatment of slag, patented a device of this character here. The molds consisted of a series of Z-shaped pieces, which, when fitted together and placed on the flat circular table, formed receptacles for the slag, the surface of the table forming their bottoms. A modification consisted of L-shaped pieces, their tops fitting in slots in a continuous ring surrounding the table. The table, which was 20 feet or more in diameter, was given an intermittent motion, so the slag could not be run on continuously.

A machine invented by Chadwick and Allen of Hartford in 1862 first contained an element which has since been developed by Davies and Walker, and is now one of the most important features of this type of machines. Each mold was provided with a lever which projected outwardly, and, after the metal had set, came in its travel into contact with a stationary cam to open the mold and cause the casting to be discharged. Upon further rotation the molds were closed again and brought into position for pouring by the striking of the levers upon a second stationary cam. About half a dozen other

hydraulic presses were stationed at one or more points to compress the ingots as they came along, and ingot strippers were also provided.

Several others in Europe tried to improve on these machines from time to time, but with that form of ingot the labor saved could not be very great, as the molds and ingots had to be manipulated almost as much as when the old systems was employed. There was some gain in speed, no doubt, but this was not of as much importance in those days as it is now, and the questions of large and rapid output and sandless pig, which have had the most to do with the adoption of casting machines, did not apply to that kind of work. The ingot car casting system, suggested by Bessemer when his name was first becoming famous in the metallurgical world, seems to be better adapted for it, especially since the introduction of F. W. Wood's improvements in this country. Although a few of the turntable machines were successfully operated in European Bessemer plants, and they were quite extensively employed in Sweden about 1880, they have not proved valuable enough to cause any inventions or improvements to be made since the early 70's. These machines had been entirely of European origin and production, no attempts to invent or improve them having been made in this country so far as known, but the first steps in what has proved to be the right direction were made in America.

The Ellerhausen process of converting crude cast iron into wrought iron was regularly in use at this time in Pittsburgh and promised to be rapidly introduced all over the country. It consisted briefly in feeding pulverized iron ore onto the surface of the crude iron as it ran from the smelting furnace into the molds.

#### Blair Casting Machine.

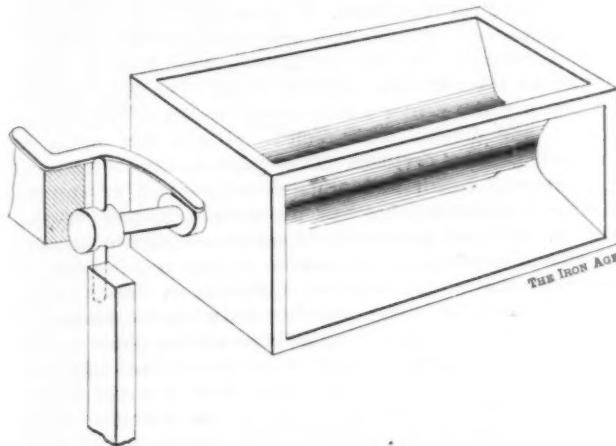
For the purpose of carrying out this process conveniently Thomas S. Blair designed a machine which was introduced into the works of Messrs. Schoenberger at Pittsburgh and the Westerman Iron Company at Sharon early in 1869. Although its chief purpose was the mixing of the ore into the molten iron, yet some of the features adopted have been of great importance in the development of the modern pig casting machine. The first machine consisted of a turntable about 18 feet in diameter, having a circular rack underneath which was operated from the engine by a pinion. The molds or troughs were of the style suggested by Smith for his slag machine, as shown in Fig. 3. The controlling vessel, located directly over the molds and receiving the metal from the ladle, was first suggested here. The plates forming the molds had to be taken apart to get the pigs or blooms out and set up again after each operation.

#### Burden Casting Machine.

The extra labor necessitated thereby was dispensed with in part by the inventions of J. A. Burden of Troy, who first applied pig molds as we know them now to this kind of machine. His machine was brought out only a few months after Blair's had proved successful in practice. The molds had flaring sides and were divided into four compartments for as many pigs, as shown in Figs 4, 5 and 6. They rested on the table and were provided with trunnions by which they were lifted from the table, overturned, immersed in a clay water vat, and returned to the table by means of a crane. Burden was the originator of the overlapping lips to permit continuous pouring and prevent dropping of metal between the molds. John Coyne of Allegheny City designed one of these machines at this time, in which the molds were hinged at the outer side of the wheel. An attendant overturned them by means of a lever onto supports, which they struck with sufficient force to jar the pigs out. Henry Davies of Newport, Ky., also suggested some improvements.

#### Slag Cooling Machines.

Several slag cooling machines of this character were invented during the next few years, only the most important of which will be mentioned here. Kloman suggested one in 1873, in which the molds passed through



THE DAVIES MOLD FOR PIG CASTING.

bullet casting machines of this character have since been designed. Meeker first provided an automatic water cooling system in this kind of machine in 1876. Burton's machine (1882) was probably the most ingenious of them; his castings were discharged down an inclined chute into a water cooling bath. The McGrath-Dalrymple machines of recent invention have elaborate water cooling devices and other features which will probably render them of considerable value when constructed.

It is to be noted that all of these machines, except that of Smith, were designed for making castings and most of them for balls and bullets. The first ones for casting ingots appeared about 1864, and in all of the early ones the bottomless ingot molds were placed in an upright position on the flat turntable. Wm. Weild of Manchester, England, the first to design one of these tables, used a nest of bottom poured molds, with the runner in the center of the table. The rotation of the table merely cut the ingots in the outer molds from the bottom runners. Emile and Pierre Martin placed the molds around the table in groups and poured at the top. Ten years later Chas. W. Siemens combined these two features and used a hydraulic crane to lift the molds and ingots on and off. The credit for first constructing a machine of this kind has been given to Pinks of the Hoerde Steel Works of Westphalia, where he put one in operation about 1872. A plant was also installed at the Elba Steel Works, near Swansea, a little later (Jour. Iron and Steel Inst., 1873, p. 183). M. Bouniard brought out an elaborate device on this principle in France at about the same time, in which hy-

water, and A. D. Elbers, who has devoted a great deal of attention to the utilization of slag, invented a very simple one in 1881. In Diebold's machine (1883) the molds were overturned when they reached a certain point in their revolution by coming into contact with a conical roller and were returned to the pouring position by running up an inclined roller. In a slag machine patented in England in 1887 Jones and Brand proposed distributors having a cross section like an inverted V and situated over the edges of the molds to insure delivery into the molds, a feature which has recently become important. Another British patent to Wm. Truran of the Linthorpe Iron Works shows a machine in which the axis of rotation is inclined about 30 degrees from the vertical, to allow the pans to pass through a water tank after pouring, the slag blocks being sprayed on top at the same time. The pans were pivotally supported on long radial arms, themselves pivoted at the hub, and were overturned in their highest position by dropping off the end of a cam track, which supported the arms everywhere else.

About this time there came a continually increasing demand for sand free pig iron for the basic open hearth process, the many reasons for which have been brought before the public many times during the past few years, and will not be discussed. There had previously been some call for sandless pig iron, which had been met by the use of the chills above mentioned and the forming of the pig beds in other substances than sand, such as slag, &c. But the object of the machines invented heretofore was to save time and labor. Now, however, an additional advantage was being suggested and the use of casting machines was being advocated on account of their product. Among the earlier advocates of this idea was Henry D. Hibbard of High Bridge, N. J., who invented a machine about 12 years ago and described it to the Iron and Steel Institute of Great Britain in 1896. The machine was provided with eight mold frames mounted radially on end trunnions on the turntable. After a half revolution the molds were overturned by hand to allow the pigs to drop out onto a car, where the pigs were further cooled down by water or otherwise. Each mold frame was provided with 20 or more pig molds, and was made reversible—that is, with mold cavities on opposite sides of the axis, so that when the pigs were dumped out of one set the other set came to an upright position ready to be poured. The reversing tilting mold was invented by Schoenberger in 1870. One of Hibbard's claims, which is still in force and will be for several years, dominates some more recent machines. It reads as follows: "In apparatus for casting pig metal a turntable carrying radially arranged series of molds mounted on pivots in the table and adapted to be overturned, substantially as and for the purposes described." The first improvement on this machine was made by Samuel W. Vaughn, then of Coopersdale. He provided the outside pivot of each mold with an arm, which was actuated to overturn the mold upon coming into contact with a fixed post at the desired point in the revolution of the turntable, an idea first suggested by Chadwick and Allen, and now embodied in the Davies machine (Fig. 7). He also provided a separate runner above each mold to allow continuous pouring without the dropping of metal between the molds, a difficulty that has now been overcome by simpler means.

Arthur S. Walker of Baltimore has invented a machine for casting copper in which the molds are supported on radiating arms projecting from the table and are filled from a ladle under the spout of the furnace. The ladle is supported on trunnions near its mouth and is operated by a small hydraulic lift at the back. The metal is not poured continuously, a deflector being placed over the molds to control and distribute it. The molds are overturned like Vaughn's, to drop the anodes or other castings into a tank of water, from which they are removed by an endless chain conveyor. This machine has been in operation at the electrolytic refinery of the Baltimore Copper Smelting & Rolling Company since July, 1897, and several machines are now in use there. One of these machines ordinarily casts a charge of 80,000 pounds into wire bars in about four hours.

#### DAVIES CASTING MACHINE.

The simplest casting machine so far designed, and the first one of this type to be introduced into practice after the successful operation of Uehling's endless chain machine was made known, was designed nearly four years ago by R. W. Davies, superintendent of the *Aetna Foundry & Machine Company* of Warren, Ohio. This invention first showed that the endless chain machine might have a rival. It offers many advantages over that type, especially in simplicity of construction, but it has not yet been able to compete very successfully with it in practice. Although most of the important features of this machine had been proposed by earlier inventors, especially Burden and Vaughn, yet it stands in the same relation to this type of machines that that of Uehling does to the endless chain type, being the first to be practically successful under the conditions of present day blast furnace practice. The machine is 40 to 50 feet in diameter, bearing from 125 to 150 molds on its periphery. These molds are mounted on rough unfinished trunnions in boxes, which are neither babbited nor turned. Each mold is reversible and provided with four mold carriers, as shown in Fig. 7. Each mold being at the bottom, always goes around empty once; this affords time to cool, be sprinkled with lime water, and dry. They are overturned in the same manner as Vaughn's, as shown. The machine requires no foundation except the center one and the outer one to carry the circular rails forming a track for the rollers. It is operated from the engine by means of a circular rack and pinion, an idea of Blair's. It is claimed that the machine can be kept in repair without the aid of a machine shop. The only finished parts are the center shaft, center bearing, center base plate and driving arrangement, all the rest being ordinary foundry castings. This roughness is the cause of its ease of repair and probably of its lack of success. Instead of overlapping lips, fire brick deflectors are supported between the molds to enable continuous pouring without cutting out the edges of the molds. One of these machines has been in operation at Canal Dover, Ohio, since 1898. The deflectors between the molds are modified by making them movable up and down in vertical guides. Rods extend down from the deflectors through the guides and are actuated by coming in contact, at their lower ends, with a cam surface. When lowered each one rests on the edge of the two adjacent molds, so they are held firmly in position during pouring and a part of their travel. The deflectors are raised by the cam to allow the molds to be rotated to discharge the pigs. Neither the molds nor pigs are brought into contact with water. The pigs are cooled in a bin with an inclined bottom made of rails spaced a short distance apart, the heat of the pigs causing a current of air to pass up through the bottom.

Improvements on the original machine have also been made by D. T. and S. W. Croxton, consisting in providing a circular platform suspended from the turntable underneath the molds to receive the pigs as they are discharged. The pigs thus travel around again exposed to the air and may be further cooled by spraying. They are removed from the platform by means of a stationary arm, which projects slantingly over it and sweeps the pigs off as they come successively into contact with it. The pigs fall down a chute into cars or trucks. In a modification there is a circular track directly under the molds passing down into and through a water tank, also under the molds. Flat cars are placed on this track and are attached to the turntable by means of chains, so as to be drawn around by the turntable. The pigs fall onto these cars and, after passing around and through the water, are swept off into other cars, as in the other case. These seem to offer some advantages, especially as to rapidity of handling and economy of space, but they render considerable additional strength necessary in the turntable itself. They have not yet been put into actual operation.

(To be continued.)

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The office of Henry S. Fleming, secretary of the Anthracite Coal Operators' Association, has been removed to Room 114, 1 Broadway.

## The Brooklyn Bridge.

### Report of the Engineers.

On the 24th of last July it was discovered on the Brooklyn Bridge that seven of the suspender rods and two of the cable bands, to which the rods are attached, were broken. All the breaks were in the rods under the north cable, three being upon one side of the slip joint at the center and six upon the other side. One account of the rupture, together with the report of C. C. Martin, chief engineer of the bridge, to the Bridge Commissioner, appeared in *The Iron Age* of August 1 last. District Attorney Philbin appointed engineers to examine the bridge and report its exact condition. The report was submitted to William Barclay Parsons, engineer of the Rapid Transit Commission of New York, and Alfred Noble, now a member of the Isthmian Canal Commission, and lately a member of the Nicaragua Canal Commission. The report was indorsed, with a few minor suggestions, by both these engineers. The investigation was made by Edward Duryea, Jr., and Joseph Mayer, the work being divided so that the former made the field inspection and the latter the mathematical computations. While the report was written by Mr. Duryea, it was thoroughly reviewed and criticised by his colleague, and there are no statements therein which are not fully assented to by both engineers. Mr. Duryea performed a like office with regard to Mr. Mayer's share of the work, making a personal and independent verification of every assumption, every formula and every stress there given.

#### The Report.

Our examination shows us that while no serious deterioration of the structure now exists, the supervision, inspection and maintenance are at fault in not removing various influences which tend to cause deterioration. The accident of July 24 last, when the breakage of two suspenders remained undiscovered until seven more failed entirely, shows the methods of supervision and inspection to be very faulty.

The supervision has also been faulty in a more general and important sense. Statements as to the safety of the bridge have been issued without obtaining, by the use of all available knowledge, the real stresses in the structure. Without a knowledge of these stresses all such statements are unwarranted.

#### SAFETY REDUCED.

Our investigation of the strength of the bridge shows that it is now practically as strong as when completed. It also shows that, while the moving loads now on the bridge are about 40 per cent. in excess of those proposed by the designer, his preliminary estimate of the probable weight of the structure itself was so much larger than its present actual weight that the combined weight of the structure and moving load is now less than 3 per cent. in excess of that assumed by him in 1882.

An increase in moving load, however, exerts a much greater effect on certain parts of the structure than would be caused by an equal increase in the structural weight. Some of the increases in moving load, also, were accompanied by reductions in the weight of floor which tend to decrease its safety. It is therefore true that, while the present combined weight of structure and moving load is very little larger than that of the designer's preliminary estimate, the increases in the moving load have reduced the safety of the bridge below that contemplated by the designer, and still more below that which it actually possessed before these increases in moving load occurred.

#### STRESSES TOO GREAT.

Our investigation shows that the stresses in cables, towers, parts of stay system, and floors, due to the most unfavorable probable combination of forces, are far in excess of those considered good and adequately safe by engineers. This is due both to increases of the moving loads above those at first contemplated and to various features of the original design.

We consider it necessary that these excessive stresses

should be reduced as soon as possible, and have suggested in the report below how this may be done at a comparatively small cost. The broad general statements above require amplification, which is given below.

#### THE ACCIDENT.

On the evening of July 24, 1901, it was discovered that nine consecutive suspenders of the bridge were broken. These suspenders were at the center of the main span and on the north cable. Two of the suspenders had been broken a long time, while those next to the unbroken ones were free from rust and had been only recently broken.

The suspender rods which failed were intended to resist tension and such small bending stresses as would arise from a swinging of the rods in the direction of the bridge on lubricated trunnions. The two rods at the middle of the span (those which had been broken a long time) were also under tension, during hottest weather, about one and a half times as great as in the case of other rods. The rods were of ample strength to withstand all these forces, however, and the failure must have been due to other causes.

#### SUSPENDER RODS AND WIND PRESSURE.

An examination of the suspender rods shows that they must (because of their design) be subjected to side bending and that their failure is due to this. We believe the most important cause of side bending is wind pressure. The wind blowing against the platform and cars causes a pressure transverse to the bridge. Much of this pressure, especially near the slip joint at the middle of the main span, must be transferred from the platform to the cables above. The only means by which it can be transferred is through the suspender rods, and then only by bending the rods, as the trunnions which were intended to provide for a motion of the rods in the direction of the bridge will prevent any motion transverse to it. The wind pressures transferred by these rods are large in amount and we believe are in themselves by repetition since the completion of the bridge sufficient to have caused the failure of the two middle rods.

At least two other causes of side bending act in conjunction with the wind pressure. An examination of the new rods which have replaced the ones which broke shows that they are being pulled to the north by the cable and are bearing hard against the top edges of their trunnions. This must be due to some defect of adjustment or construction by which the rods fail to lie in the plane of the cable, or the trunnions fail to be perpendicular to this plane.

The remaining cause of the side bending is the only one (unless the whole design of the suspender rods were changed for the better) which could have been remedied by more careful supervision. The rods were intended for use with lubricated trunnions, and the trunnions show no evidence of lubrication. The one removed and taken apart for examination was fixed tightly in the plates by rust and paint and must certainly have caused bending of the rod in the direction of the bridge.

The breaking of the seven other suspenders is directly due to the two rods broken first having been allowed to continue in the structure. This was due to inefficient supervision and inspection, which will be treated more fully below.

The accident showed that the rod suspenders are of insufficient strength to withstand the actual conditions existing, and that similar failures may occur on the other cables. The necessity is, therefore, apparent of very thorough and close supervision.

It was in our opinion wise to lighten the loads on the bridge by a partial stoppage of traffic when the breaks were discovered, as the indications are that the breakage would otherwise have spread to more of the suspenders and might have reached serious proportions.

#### NEGLECT AND CARELESSNESS.

We believe the following facts to show that the officials in charge of the New York and Brooklyn Bridge have been neglectful and careless in their supervision and maintenance of the structure.

Many of the diagonal bars and sway rods of the stiff-

fening trusses have been allowed to wear by rubbing against each other, and many of the suspender ropes by rubbing against the floor of the promenade. No effort has been made to prevent such wearing, though it could easily have been prevented at any time since the completion of the Bridge.

Water and mud have been allowed to accumulate and remain in portions of the bottom chords, and road sweepings in the bottom of the floor beams around the suspender stirrups. It is commonly admitted that such conditions should not be allowed in steel bridges and the existence of them is a proof of inefficient and careless supervision and maintenance.

The saddles supporting the cables on tops of towers, now fixed, were intended by the designers to be movable, and an efficient supervision of the bridge would have used all means necessary to keep them so. Our inspection, however, shows no efforts whatever in this direction, ridges of rust, paint and dirt being found on the bed plates along the outer rollers.

The trunnions at the bottom of the suspender rods were intended to be lubricated. They show no evidence of lubrication, though this could have been easily provided for.

A number of the stirrup rods of the wire suspenders were found improperly adjusted. This condition could occur only under an inefficient method of inspection.

#### INSPECTION NOMINAL.

Of the nine suspenders which were discovered to be broken on July 24 last, two had been broken a long time. The presence of these two broken suspenders in the structure, undiscovered, proves that the inspection of the bridge must have been either very infrequent or merely nominal, at least so far as regards this detail. The necessity of a frequent and thorough inspection of this special detail should have been recognized by the Bridge Department, as it was stated by them, after the accident, that similar breakages had occurred at previous times. It was evidently their duty, in view of the recognized liability to breakage of these rods, either to replace them by some new device better adapted to withstand the forces acting, or to at least make such frequent and thorough inspections that any broken rod would have been discovered within a day or two after the break occurred. The inspection actually made, however, was of a nature which allowed the two rods first broken to remain undiscovered in the structure for a long time and until the break had spread to seven others, and it was even said, we do not know with what truth, that even then the breakage was not discovered by employees of the Bridge Department.

#### HAMMER TEST.

It has been stated that no ordinary methods of inspection would have shown the breakage of these rods, and that if the break occurred below the top of the trunnion it could not have been discovered until the broken end appeared above the top.

One of the commonest ways of testing the soundness of such parts of a bridge is by blows of a hammer. A broken rod—or even an unbroken one having very little stress in it—can be detected without difficulty by its sound under such blows. This was recognized by the Bridge Department, as shortly after the accident all three rods of the north cable at center of main span were so tested, by them, as shown by defacement of the paint where the rods were struck. This test by hammer blows, however, was even then applied to only a few of the rods on the other cables, though many of these rods were just as liable to failure as those which actually did fail at the northernmost cable.

A merely visual inspection, without the use of the hammer, is also sufficient to show the breakage of a suspender rod. The least lifting of a rod will break the paint film connecting the rod with the top of the trunnion or bring into view a portion of the rod unpainted or differently painted, which was before within the trunnion. With the former condition of the paint known, either of these changes in appearance should be sufficient to excite suspicion as to the soundness of the rod, and to cause more conclusive tests with the hammer or the wrench.

#### METHOD OF INSPECTION NOT GOOD PRACTICE.

The method of inspection in vogue on this bridge is at direct variance with the methods in general use on good American railroads. The usual methods are to have the inspection made by engineers in person, at stated intervals (once, twice, four times, or even—in one case we have been told of—twelve times per year) and the results recorded on printed forms which make it impossible, without falsehood, to forget or neglect any special features.

The inspection on this bridge seems to have been done entirely by mechanics, at no stated times, and with no record sheets returned to the office as a guarantee that the inspection had actually been made.

In our opinion this method of inspection is nominal only and entirely inefficient. That it cannot be depended upon to keep the bridge in a safe condition is clearly proved by the failure, under its continuance, to discover the two broken rods in time to prevent the break spreading to other rods. The safety of the bridge demands that the method should be changed at once to that generally recognized as the best—an inspection by engineers in person, at frequent, stated intervals, and with the result recorded on printed forms. With the bridge in its present condition, we believe that some parts of it should be inspected daily, others weekly, and every part at least monthly.

#### NO EXACT RECORDS KEPT.

In addition to the facts given above, we believe the supervision of the bridge has been lax and inefficient in a more general and important way, as specified below.

No exact records have been kept of the condition of the structure, and no complete and correct set of drawings exists. Without these it is impossible to calculate the actual stresses, which must be known before any definite and reliable statement can be made in regard to the degree of safety of the bridge. A careful supervision would have kept such records and would have made calculations of the actual stresses in every affected part whenever any changes were made in either load or structure; it would long since have discovered and remedied the weakness of various parts of the floor.

An efficient supervision would have studied all the published scientific discussions of suspension bridges, and would have been warned by statements made by eminent engineers in the Transactions of the American Society of Civil Engineers that large secondary stresses occur in wrapped cables of suspension bridges having stiffening trusses with center hinges. It does not require any unusual ability to know, after attention is drawn to the fact, that secondary stresses of considerable amount must exist in the cables of this bridge. The engineers in charge of the bridge should have either calculated these secondary stresses to assure themselves that the stresses are not of dangerous amount, or should have suggested changes which would reduce these stresses to safe amounts.

No statements should have been made in regard to the safety of the bridge until after all available knowledge had been used to determine the stresses, which must be known before any reliable assertion is possible. The amount of knowledge and care here specified is necessary to secure the safety of the public.

Such deterioration as has occurred has not appreciably diminished the strength of the structure as a whole. This will be taken up below under "Safety of the Bridge." The bars and rods which have been somewhat worn by rubbing were larger than necessary to begin with, and are still of ample strength for their duties. The same is true of such members as have had their sections reduced by rust. The immovability of the saddles increases the stresses in tower masonry considerably, but in another way exerts a good effect on the bridge by keeping the stresses in cables at center of main span lower than they would be if the saddles were movable.

#### SAFETY OF THE BRIDGE UNDER THE PRESENT LOADS.

In taking up this part of our report it is necessary to explain just what is meant among engineers by the term safety as applied to a structure.

In discussing the strength of engineering structures

the term "factor of safety" is constantly used. By this is meant the ratio between the stress which would cause sudden failure from a single application and that actually existing in the structure or member. The latter stress is called the working stress of the material and the former its ultimate strength.

Though the factor of safety of a structure is by common practice fixed with respect to the ultimate strength of the material, there is a much smaller stress under which it will fail slowly if the application is repeated many times. This stress is called the elastic limit or the elastic strength, and is about six-tenths of the ultimate strength in the case of structural steel and over two-thirds for steel wire. In the case of structural steel having an ultimate strength of 60,000 pounds per square inch and a working stress of 20,000 pounds, the factor of safety is said to be 3, though under a stress of 36,000 pounds per square inch repeated millions of times the structure would slowly fail.

Experience has taught that because of a lack of complete knowledge of the quality of each piece used in a structure and of all the stresses existing, it is never prudent (even when all the known stresses are considered) to use working stresses in excess of about two-thirds of the elastic limit. When the added destructive effect of moving loads is not included in the stress, the working stresses are made much smaller. It is evident, therefore, that the same so-called factor of safety gives very different degrees of real safety, according to the kind of material used and according to the methods and completeness with which the stresses in the structure are determined. If the material used is very uniform in quality and with its elastic limit high in proportion to its ultimate strength, the real safety of the structure will be greater than otherwise. If the stresses used in proportioning a member include all the secondary stresses, the real safety obtained with the same factor of safety is much greater than if only the principal stresses are considered.

The only safe course in dealing with uncommon structures or details is to calculate all the determinable stresses and then choose such a factor of safety that there is a certainty that the actual working stresses which may occur shall always be well below the elastic limit in all parts of the structure. This certainty of safety can be attained only when the details are so designed that those stresses which cannot be accurately calculated are small. The mere statement that a certain bridge has a given factor of safety means little. Unless it is known how the stresses were calculated, what ones were included and what omitted, what is the uniformity of the material and the ratio between its elastic limit and its ultimate strength, and what are the details of the bridge no opinion of value can be formed as to its real safety.

The present safety of the bridge can therefore be determined only by calculating all the stresses of considerable size and then comparing these stresses with the present strength of the corresponding members, as determined from the working stresses considered safe by the best practice.

If the safety is found to be defective this may be due to any one of the following four causes:

1. Physical deterioration of its materials or members.
2. Changes made in the structure since its completion.
3. Increases of moving loads beyond those for which the bridge was designed, and
4. Defects in the original design.

#### PHYSICAL DETERIORATION.

This might ensue from a reduction of the sections of members by rusting or wearing or from a reduction in the strength of the steel due to a repetition of stresses near the elastic limit.

The latter cause cannot have occurred except in a few details, notably the stirrups of stays and of some of the suspenders and in the suspender rods near the center of main span. The physical examination shows that the reductions of sections by rust and wearing are in no case serious and do not exist in the members having the smallest factors of safety.

Electrolysis has often been mentioned in newspapers as a possible cause of weakening of the bridge. This is merely a form of rust caused by electricity under certain conditions, and there is no evidence that these conditions exist in the bridge.

In our opinion no material loss of strength from physical deterioration has occurred in the bridge.

#### CHANGES MADE IN STRUCTURE.

The only change known to us is a lightening in the weight of railroad floors by widening the spaces between ties and omitting the tie spacers (guard rails). This change reduces the safety of the structure locally in case of derailment, but if it had not been made, the already too small factor of safety in the cables would have been still smaller.

#### INCREASES OF MOVING LOADS.

The moving loads on the span as a whole have already been partially treated. They are seen to be much larger than those proposed by the designer.

The load from trolley cars varies greatly with the interpretation and enforcement of the 102 feet spacing between cars. The Board of Experts which in 1897 reported on the safety of the bridge and the practicability of allowing trolley cars and elevated trains to use it recommended that this spacing be made 102 feet clear distance between cars, while the Bridge Department, to judge from a report made in December, 1898, seems to have adopted a spacing of 102 feet front to front. We have adopted the latter as our moving load, as it may be inferred to be the regulation, and in any case seems to us nearer the actual condition. This interpretation increases the load from present heaviest trolley cars to about 136 per cent. of what it would be for 102 feet clear distance and to about 108 per cent. of what would be the full moving load on the bridge with that spacing. It increases the sum of the moving and fixed loads by only about 2 per cent., however, so it is evident that no change in the spacing of trolley cars—except such a large one as would seriously interfere with the use of the bridge—can effect any decided increase in the safety of the bridge. The restrictions as to minimum spacing of cars, however, should be strictly enforced.

The above refers only to moving loads affecting the main members of the bridge, as the cables. Those affecting the floor only, such as weights on wheels, have also to be considered. Only in one instance have the wheel loads been increased above those proposed by the designer, this increase being the change in weight from 32 to 34 tons of the motor or grip cars using the railroad tracks. It is not known whether the wooden stringers were strengthened when this increase of weight was made, but in either case both these stringers and some other parts of the floor are now under stresses greater than are considered good practice.

Much has been published as to the large weight of extraneous dead load on the bridge in the form of mail tubes, telegraph and telephone cables, &c. We have found no useless dead load on the bridge and the combined weight of mail tubes and telegraph and telephone wires is only 1.5 per cent. of the total moving and dead load.

It is evident that of the three causes just described only one—the increase in the moving load—has had any serious effect in decreasing the safety of the bridge. This loss of safety could, of course, be recovered by reducing the moving loads to their former amounts, but to do this would reduce the usefulness of the bridge very greatly, and should not be considered except as a very temporary arrangement or a last desperate expedient.

Because of certain unperceived defects in the original design, however, the bridge has never actually been as strong or as safe as it was believed to be. Those defects are of such a nature that, although serious in their effect, they can be remedied in a comparatively short time and at a comparatively small cost. It is believed, also, that when these defects are removed the bridge will not only be safe under its present loads, but that these loads may even be safely increased.

The safety of the bridge, therefore, should be increased by remedying the defects in the design.

## DEFECTS IN THE ORIGINAL DESIGN.

In considering the defects of the design it should be borne in mind that this bridge was designed over 20 years ago, when steel as a material for bridges was just coming into use. The science of bridge designing was then very much cruder than now and very little attention was paid to secondary stresses. It is difficult at the present day, even by an effort, to realize the changes which have occurred since that time in the point of view. Many of the features which now seem self evident errors have been realized as such only from the lessons taught by their use in early bridges. We, therefore, hope that our criticisms will be accepted as referring to the design, not to the designer. Our effort has been to measure the structure as it now stands, irrespective of its origin or the conditions under which it was designed, by the standards of the best present practice in bridge design.

Before mentioning the principal defects in design which act to lessen the safety of the bridge, we wish to point out that the computations on which our conclusions are based are in many respects necessarily incomplete and inexact. The lack of adequate plans of the bridge is such that a complete survey of the structure would be necessary in order to obtain a full and reliable knowledge of its members. Such a survey would alone take more time than that allowed for our entire investigation. We have made no investigation of the stresses caused by wind, as the lack of plans and the lack of time were each in themselves sufficient to prevent our doing so. The same statement will apply to all stresses in the end spans.

We have, therefore, confined our investigation to the main span, where the observed failures occurred, and to its action under vertical loads only. The time allowed us was barely sufficient for even this, as the structure is a very complicated one, resisting either vertical or horizontal forces by means of three combined systems, and required the development of many special original formulas for its calculation.

Many of the details of this bridge are entirely different from those of ordinary bridges and need careful study. A much more extensive investigation would be necessary before it would be possible to point out all the defective parts that must be improved before the bridge can be made as safe as is now considered good practice.

Our investigation has, however, been both complete enough and exact enough for us to state conclusively that the bridge does not conform to the usual standards of safety; that improvements increasing its safety are imperative, and that such improvements can be made at a comparatively moderate cost and without materially interfering with traffic.

## DEFECTS OF DESIGN.

The principal defects of design observed as causing a decrease in the safety will now be mentioned.

## EXCESSIVE STRESSES IN CABLES AT THE CENTER HINGE.

This is the most serious cause of danger in the bridge. Our calculations show the maximum stresses to be, if no account is taken of the loads borne by the stay system:

	Pounds per square inch.
From fixed and moving loads.....	44,800
From bending of cable as a whole.....	28,600
From bending of individual wires.....	2,000
Total.....	75,400

The stay system does carry some of the loads, though it is impossible to say how much, since the original adjustment has been changed by the failure of the bottom chords in 1898. It is believed that if the stresses in the cable from fixed and moving loads are assumed to be reduced 10 per cent, because of the help afforded by the stays, an ample allowance will have been made. The strength of the stay system is greatly reduced by the weakness of its end connections, in which failure would occur long before the strength of the ropes is reached.

If the 75,400 pounds per square inch stress above be reduced by the amount which may perhaps be eliminated by the stays, the stress in the cables from above cause is 71,000 pounds per square inch. This is about 18 per

cent. in excess of what we regard as the permissible working stress, 60,000 pounds per square inch. This stress of 71,000 pounds is, however, increased by the wind pressures, but to what extent is not yet known. The condition, therefore, is a very serious one—that of a stress in the cables much above the safe limit, but with its exact amount unknown.

Means by which the stresses in cables due to bending may be largely reduced are described in Appendix D. [This appendix is very voluminous, and considers the subject in all its details from a mathematical standpoint. The remedy proposed is here described.] They consist in removing the wrapping from cables for a few feet at each slip joint, and using sleeves at these points to fix the least radius in which the cables can bend. We believe that by these means the bending stresses may be reduced to one-fifth or less of their present amount and that the work will entail no serious interruption to traffic, can be completed within three or four months after the money is available, and at a cost of perhaps \$30,000. No estimates have been made, however, and the time and cost given are merely guesses. It should be added that the full maximum stress in the cables cannot occur at present, as the hottest weather is one of the conditions necessary to produce it.

## WIND STRESSES IN CENTER SUSPENDERS.

The transference of the wind pressures from the trusses to the cables through these rods causes bending in the rods, and we believe this cause alone is sufficient to account for their failure. A new design should be adopted, by means of which tension only would occur in the suspenders. The wind pressures should be transferred from floor to cables by a separate detail. In the meantime, any serious results from their possible failure may be guarded against by frequent inspections.

## EXCESSIVE STRESSES IN MASONRY OF TOWERS.

The maximum pressure existing in the masonry of the towers, with saddles immovable as at present, is (neglecting wind pressure) at least 39.6 tons per square foot. The exact amount is uncertain, and may be considerably more. The working stress should not be more than 20 tons per square foot. Even this is generally considered a high value. Making the saddles movable would reduce the maximum pressure to about 35 tons per square foot, and would diminish the present uncertainty as to the exact amount; it would, at the same time, however, increase the stresses in the cables from bending, already too high and not accurately known.

A means has been suggested in Appendix F, and shown in outline by which the pressure in the masonry can be reduced to about 25 tons per square foot. [This appendix is presented below, together with the drawing.] It would at the same time reduce the stresses in the cables and anchorages to an extent sufficient to permit strengthening the floors and increasing the moving loads by relaxing the restrictions on spacing of trolley cars, without harm to the bridge from the resulting additions to its weight.

This improvement consists in strengthening the stay system, releasing the saddles from their fixed positions and adding anchorages under each shore span. The idea of the anchorage itself is an old one, having been suggested for the design of this bridge, and being a feature of one of the designs for a bridge over the Hudson; some of the features accompanying it here we believe to be new, however.

## EXCESSIVE STRESSES IN FLOORS.

*Main Floor Beam.*—The actual stress in the chords is 15,500 pounds per square inch and the working stress should be only 14,000 pounds. The larger stress is, however, the result of increase in the loads and not of defects in the design. The stress can easily be reduced to the desired working stress by increasing the length of the cover plates.

*Intermediate Floor Beams of Railroad Tracks.*—The actual stress is 27,000 pounds per square inch and should be only 14,000 pounds. The excess is due partly to defects in the design and partly to increase in loads.

*Intermediate Floor Beam of Roadway.*—The stress is 25,000 pounds per square inch and should be only 14,000

pounds. The wheel loads have not been increased.

*Channels Supporting Intermediate Floor Beams.*—Those along the outer high truss have stresses of 34,000 pounds per square inch and those along the inner high truss 17,000 pounds. The excess is due partly to design and partly to increases in loads. The working stress should be only 14,000 pounds.

*Wooden Stringers of Railroad Tracks.*—These have actual stresses of 1750 pounds per square inch and should have only 1300 pounds. In cases where the joints come between floor beams the stringers have still less strength and most of the wheel load must be carried by the rail. This is extremely bad practice.

*Four by Ten Inch Planks of Roadways.*—Those below trolley wheels have 3140 pounds stress and those below wagon wheels 1550 pounds. The stress should not be more than 1300 pounds. In neither case have the wheel loads been increased.

#### COST OF IMPROVEMENT, \$500,000 TO \$750,000.

If the improvement of stay system is made so that the dead weight of bridge may be safely increased, all of above defects can be easily remedied. While we have made no plans or estimates and the statement is merely a guess, we think that the entire improvement can be made at a cost of from \$500,000 to \$750,000, and within less than three years' time. The necessary calculations are very intricate and difficult, and it might take all of the first year to make the survey of the structure, finish the computations and complete the plans.

Nothing has been said as to the safety of the anchorages. Our computations show them to be amply safe. Their factor of safety against sliding is 2.45 with the present loads, while ordinary practice requires only 2.

#### NORTH CABLE OUT OF TRUE.

The appendices elaborate various parts of the report. Here are extracts:

"Some of the newspapers reported that when the broken rods were discovered measurements showed that the floor beams at these rods had sagged several inches at their upstream ends, or that the cable had lifted that amount. This is manifestly impossible, as a small part of such a rise would bring the cable above the line joining the two first unbroken suspenders, and such a sag would cause the ruin of the floor beams. It is a fact, however, that the distance from cable to floor beam was and is greater at the northernmost cable than at any other, this cable being now about 7 inches higher than the others. [Under date of August 1 last we published a half-tone engraving showing deflection in top chords at center of the bridge as viewed from the roadway.] For some years past the span of the northernmost cable has been longer by several inches than those of the others, thus causing the center of this cable to hang at a higher elevation.

"We were told that the rods used in the bridge to replace those that were broken were made by welding new ends to the bodies of the broken rods. These rods are said to be steel, of 75,000 pounds per square inch ultimate strength and of 45,000 pounds elastic limit. It is a common belief among engineers that welds in steel of this degree of hardness are not only difficult to make, but uncertain and not to be relied upon even when seemingly successfully made.

#### STIRRUP RODS IMPROPERLY ADJUSTED.

"Some of the stirrup rods of wire rope suspenders were found to have been readjusted carelessly, so as to cause either eccentric or unequal and eccentric pulls in the two rods forming stirrup. This unequal or eccentric pull was caused merely by screwing down the two nuts on top ends of stirrup rods unequal amounts, so as to throw all the bearing either on one rod or on the edges of the two nuts.

"In the first case the available strength of the stirrup is reduced to about one-twentieth and in the second case to about one-fifth of what it would be with full and equal bearings on the two nuts. Eccentric stresses are also caused in the wire rope where it enters the cast socket. This faulty adjustment was noted by specific position numbers in about 20 places, and about as many more cases were seen, but not specifically noted. As the

total number of wire suspenders in the bridge is 1096, the proportion having their available strength largely reduced by faulty adjustment is certainly not great. In many cases, however, the faultily adjusted suspenders were found near (not next) each other, in groups of two or three, giving a weak spot in the suspender system in which failure would occur under much less stress than in the well adjusted portions, and from which it would then tend to spread to the adjacent well adjusted suspenders. The faulty adjustment of suspenders, therefore, seems to us much more serious than is indicated by the relatively small number of cases.

"This faulty adjustment is plainly evident to any ordinary conscientious visual inspection, and the failure to observe and correct it, even in the comparatively few instances found, indicates a faulty and inefficient method of inspection. In some cases the nuts had been turned down since the last painting and the unequal lengths of unpainted thread exposed above the two nuts showed plainly that previous to this careless turning down the two nuts each had full bearing."

#### APPENDIX F.

##### THE SUGGESTED IMPROVEMENT OF STIFFENING SYSTEM

Our calculation of the deflections of stay system and cables with movable saddles has been shown that, if the load on stay system changes from zero in the case of one loading of bridge to, in the case of another loading of bridge, a load on stay system varying uniformly from 4000 pounds per foot of bridge at end of stay system to 9000 pounds per foot at tower, the motions of saddles are reduced to small amounts, even if their friction is negligible. In this calculation the moving load was assumed to be sometimes 1 ton per foot on river span with the shore spans unloaded, and sometimes 1 ton per foot on shore spans with the river span unloaded; it was always assumed symmetrical to axis of bridge.

Much smaller amounts of moving load, if unsymmetrical to axis of bridge, will produce the same effect on one of the four stay systems, but not on the center pillars, which are the weakest parts of the towers. It is for this reason that the inequality of moving loads in main and shore spans, assumed for the calculation of bending stresses in towers, was taken 1300 pounds per foot of bridge, while it was taken 2000 pounds per foot of bridge in the calculation of stay system.

The fixed saddles at the tops of the towers produce increased and not accurately known bending stresses in center pillars of the towers. If the saddles are made free, largely increased stresses will occur in stay system; it is unable to carry them, and should, therefore, be strengthened. This strengthening of stay system increases bending stresses in the towers. The floors should also be strengthened, and this will increase dead loads and the stresses in cables, towers and anchorages.

It would be very desirable to be able to safely remove the existing restrictions on car traffic. This would increase the moving loads and the stresses in cables, towers, anchorages, stiffening trusses and stay system.

In making any or all of the above changes, increase in the stresses in cables and anchorages should be avoided. It is also very desirable to reduce the bending stresses in towers.

These aims can all be attained by strengthening the stay system, freeing the saddles and introducing anchored bents or ropes near shore ends of stay system.

By the strengthening of stay system the cables and anchorages can be relieved of part of their present load, and will thereby be enabled to carry instead, with equal safety as at present, the increased dead and moving loads due to strengthening of floors and removing of restrictions on car traffic.

#### PROPOSED PLAN.

This strengthening of stay system consists in improving the connections of present stays, introducing some new stays and providing altogether new horizontal struts at bottom ends of the stays.

The stay system can only be made to carry more load by straightening the cables above it, which would let down the center of main span and diminish the least clearance above the river. To avoid this, and to reduce

bending stresses in towers, anchored bents or ropes should be introduced near shore ends of stay system. The last stays connecting with floor near anchored bents should run over movable saddles on top of the towers. The stays nearer the towers should be immovably connected to the tops of the towers. The cables should be connected with the anchored bents or ropes by ropes of adequate strength.

By these means the floor and cables near anchored bents may be kept at an almost uniform height near the lowest position which they now take at high temperature with shore spans fully loaded. If anchored ropes are used the cables and floors must be held by them at the lowest position which moving load and high temperature will produce. This might result in making the least clear height at center of main span much more than at present, which is not desirable. The calculations necessary to determine the balance of advantage for either ropes or bents cannot be made without knowing the present curve of cables, or their length. The stays fixed to the tops of the towers should be so adjusted that at mean temperature with half the largest moving load uniformly distributed over bridge they carry the same load on both sides of the tower. In this case their horizontal pulls at the top of the tower will balance. The stays which run over movable saddles at the tops of the towers will exert no horizontal pull on towers under any circumstances, except that due to friction of rollers; this, with good roller beds, is small.

The principal bending stresses in towers arise from change of position of preponderant moving load. An increase in moving load on main span will lower the cables of main span and increase the loads on stays. The stays running over saddles will produce a tension in anchor bents. The cables in shore spans will rise and also produce a tension in anchor bents. If the anchor bents are 400 feet from centers of towers, if the height of stay system at center of tower is 150 feet, and if the tension in anchor bent is  $T$ —then the pull toward river at the top of each tower is reduced through the presence of the anchor bents by

$$\frac{T \cdot 0.400}{150}$$

If the shore spans are loaded, the cables will fall in shore spans and rise in main span. The tension in stays running over saddles is reduced and this produces compression in anchor bent; the falling of cables in shore spans also produces compression in anchor bent. If the total compression is  $C$ , the pull at top of tower is reduced through the presence of the anchor bent by

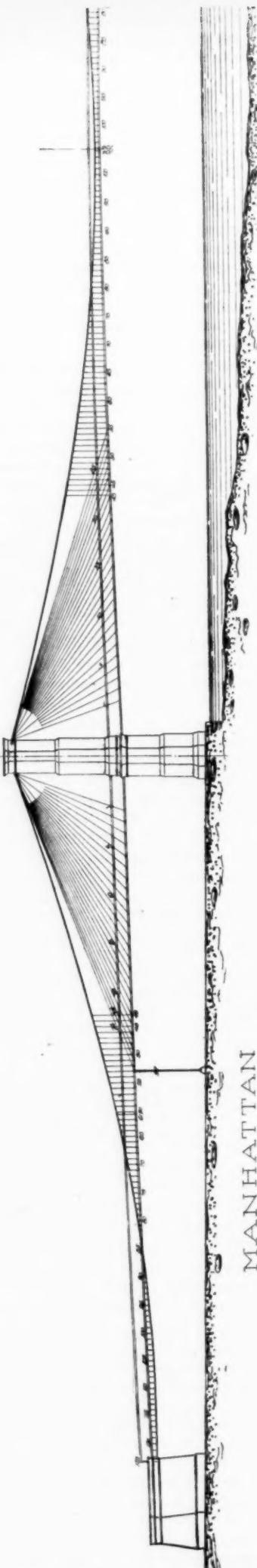
$$\frac{C \cdot 0.400}{150} \quad \text{The total reduction of variation of horizontal}$$

$$\text{pull at top of tower is, therefore } \frac{(C + T) \cdot 400}{150}$$

Most of the variation in dip of main span of cables with stiffening system absent, and most of the motion of saddles, is due to the change in dip of shore spans and the consequent change of curve of cables from anchorage to saddles. The bents near shore ends of stay system prevent most of the change in deflection of rear cables, and reduce thereby the motion of saddles to a small part of what it would be in their absence. They perform, therefore, with the assistance of the stays connected near them and running over moving saddles at tops of towers, the major part of the function of stay system, and that without producing bending stresses in towers. They also prevent rise of shore span, and consequent fall of main span when the latter is preponderantly loaded, more effectively than would be done by the stay system alone; and thus prevent the reduction of least clearance above river in center of main span, which would occur in their absence in consequence of straightening of cables over stays.

The stresses and deflections due to the introduction of these bents can be calculated with sufficient accuracy. It is, however, important that the adjustment of stays and suspenders should be made to agree with the assumptions of the calculations.

It is estimated that over six-tenths of the bending stresses in towers can be removed by the introduction of these bents, thereby reducing the largest stress per square foot in the masonry by over 10 tons. The



*Side Elevation, Showing Proposed Method of Relieving the Cables of a Portion of the Load.*

THE BROOKLYN BRIDGE.

MANHATTAN

strengthened stay system, with the anchored bents, will permit all the necessary additions to dead load of bridge which would be caused by strengthening its floors, and also the increases in moving load due to removal of restrictions on trolley cars, without producing larger stresses in any part of bridge than are perfectly safe.

#### The Drawing.

[The plan proposed will be understood from the drawing. A vertical anchorage is introduced near the center of the shore spans. Strengthening the entire truss system to enable it to resist the compression stresses to be brought upon it. The suspenders between the vertical anchorages and towers are to be removed, thus relieving the cables, and this portion of the truss system is to be carried by stays from the tops of the towers.]

#### Conclusions.

We find that some deterioration of the bridge has been allowed to occur because of improper supervision and inspection, but that at present because of repairs no important deterioration exists and that the structure is practically as strong now as when completed.

Its safety, however, due to increase in the moving loads, is less than when the bridge was completed, and because of defects in the design has never been so great as was supposed, and is now much below the degree considered good practice for ordinary bridges.

We believe the present margin of safety to be so small that the necessity for repairs is very urgent and have suggested means by which the safety can be largely increased without materially interfering with the traffic and at a comparatively small cost.

We believe the present methods of supervision, inspection and maintenance to be very faulty and not such as will with any certainty keep the bridge in a safe condition.

### The Philadelphia Foundrymen's Association.

The one hundred and eleventh regular meeting of the Philadelphia Foundrymen's Association was held at the Manufacturers' Club, Wednesday evening, October 2, Thomas I. Rankin, president of the association, occupying the chair. There was a large and representative attendance, among whom may be mentioned:

I. W. Rankin, Abram Cox Stove Company, Philadelphia.  
 Jas. S. Stirling, Harlan & Hollingsworth, Wilmington, Del.  
 I. R. Newkirk, J. B. Newkirk & Co., Philadelphia.  
 M. F. Carr, J. W. Paxson Company, Philadelphia.  
 Wm. Hanson, Pennsylvania Iron Works Company, Philadelphia.  
 P. D. Wanner, Reading Foundry Company, Reading, Pa.  
 August Williams, Enterprise Mfg. Company, Philadelphia.  
 J. T. Marsh, S. Baltimore Foundry, Baltimore, Md.  
 Thos. Devlin, Thos. Devlin & Co., Philadelphia.  
 Geo. H. Wadsworth, Wadsworth & Sherwin Core Machine Company, Kent, Ohio.  
 A. A. Miller, *The Iron Age*, Philadelphia.  
 Geo. C. Davis, chemist, Philadelphia.  
 Geo. Binkert, G. Rebman & Co., Philadelphia.  
 W. W. Nichols, Tabor Mfg. Company, Philadelphia.  
 C. S. Lovell, Tabor Mfg. Company, Philadelphia.  
 F. C. Price, E. J. Etting, Philadelphia.  
 A. G. Warren, J. W. Paxson Company, Philadelphia.  
 John Smith, Midvale Steel Company, Philadelphia.  
 Paul Van Fleet, I. A. Sheppard & Co., Philadelphia.  
 W. W. Holt, Camden Foundry Company, Camden, N. J.  
 A. J. Carroll, Camden Foundry Company, Camden, N. J.  
 R. C. Olliphant, Trenton Malleable Iron Company, Trenton, N. J.  
 P. S. Braucher, P. & R. Shops, Reading, Pa.  
 Robt. A. Patton, Abram Cox Stove Company, Philadelphia.  
 J. S. Culbertson, Philadelphia.  
 A. C. Roberts, Jr., Chas. Perkes, Philadelphia.  
 Thos. Blackwell, Chas. Perkes, Philadelphia.  
 John Fleming, S. J. Creswell Iron Works, Philadelphia.  
 B. Booz, I. A. Sheppard & Co., Philadelphia.  
 Howard Evans, J. W. Paxson Company, Philadelphia.

After calling the meeting to order the minutes of the previous meeting were disposed of in the usual manner, and the ordinary routine business transacted. Under new business the Executive Committee reported on the matter of incorporation for the association, and after discussion it was moved by P. D. Wanner that "The Executive Committee be empowered to proceed with the matter, and take necessary steps for the incorporation of the association under the name of the Foundrymen's Association of Philadelphia, Pa." This motion was seconded, and on vote of members, was carried. Further

new business consisted of the nomination of officers of the association for the year 1901-1902, and on motion of Thomas Devlin, which was duly seconded, the present officers were all named for nomination to succeed themselves. The nominations are as follows:

President, Thomas I. Rankin, Abram Cox Stove Company, Philadelphia.

Vice-President, James S. Sterling, Harlan & Hollingsworth Company, Wilmington, Del.

Treasurer, Josiah Thompson, J. Thompson & Co., Philadelphia.

Secretary, Howard Evans, J. W. Paxson Company, Philadelphia.

#### EXECUTIVE COMMITTEE.

Antonio C. Pessano, chairman, Geo. V. Cresson Company, Philadelphia.

Stanley G. Flagg, Jr., Stanley G. Flagg & Co., Philadelphia.

E. E. Brown, E. E. Brown & Co., Philadelphia.

Jno. Glover, Glover Bros., Philadelphia.

William Hanson, Pennsylvania Iron Works Company, Philadelphia.

Ballots will be cast at the next meeting, November 6, 1901, it being the annual meeting of the association.

The association then proceeded with the papers for the evening, and Geo. H. Wadsworth of Kent, Ohio, was introduced, and read a paper on the

#### "Wadsworth and Sherwin Hand Power Core Machine."

Mr. Wadsworth said:

"You are all, no doubt, familiar with the old process of making cores by the old method of core boxes, putting in the sand and ramming by hand. In some instances cores are made in two halves and pasted together to make a round core. In other cases the core box is made the size and shape of core required, and after the core is rammed up the box is parted to allow the core to be taken out and put on the core tray to be placed in the oven. By either process the work is slow, tedious and very unsatisfactory, because a core of any length to get strength enough to stand up to its work must, in most cases, have a rod or wire put in. This also adds to the expense. There is always considerable loss, as cores made by this process are very delicate, and will stand but very little handling. There is also the trouble, annoyance and expense of keeping the wooden core boxes in perfect condition.

"With the Wadsworth & Sherwin core machine there are made ten sizes of cores from  $\frac{3}{8}$  to  $1\frac{1}{2}$  by  $\frac{1}{8}$  round cores; and also square, hexagon and D., or cores of other irregular shapes. In length of 24 inches the machine has a capacity of 120 feet of any size of these cores in one hour. All cores are straight, and are vented from end to end.

"The cost of production taken upon a basis of 10 cents an hour, or \$1 per day, is for 12 feet of finished core 1 cent. There are very few parts to wear or get out of repair, and since all parts are made duplicate any piece of the machine can very easily be replaced at small cost. Over half the oven space may be saved, as all the cores are of one piece. The vent may be taken from the core and thus the risk of losing a casting by a blow from the cores is reduced."

The core machine, as well as its various attachments for different sized cores, and green and dried cores of different sizes and length, were on exhibition; after the reading of the paper Mr. Wadsworth demonstrated the operation of the machine by the manufacture of cores of various sizes, rapidity of change in making attachments on the machine, &c. Considerable individual interest was taken by the members present, and the various details and possibilities of the machine were carefully examined, at the conclusion of which a unanimous vote of thanks was tendered Mr. Wadsworth for his interesting paper and demonstration.

The meeting then adjourned, and those present proceeded to the roof garden of the club, where luncheon was served; Howard Evans acting as toastmaster, called upon P. D. Wanner, T. W. Rankin, J. S. Stirling, J. T. Marsh, W. W. Nichols, C. S. Lovell and others; each of whom responded in an interesting manner, after which the social session was adjourned.

A submarine boat of the Holland type, built by Vickers Sons & Maxim, was launched last week at Yarrow, England.

## The Philippine Tariff.

The War Department has made public the revised customs tariff of the Philippine Archipelago as enacted on September 17 by the United States Philippine Commission. The following general rules have been established:

### General Rules.

Rule 13. Articles not enumerated in the tariff shall, for the application of duty, be assimilated to those which they most closely resemble (See Rule 15), and shall in the first instance be so classified by the collector of the port of entry into which the articles are brought.

When an article presented for appraisal is not mentioned in a number of the tariff or in the repertory, and when doubts arise as to its assimilation to articles specified in the tariff, the interested party or the importer may request the collector at the port of entry to indicate the number according to which such article is dutiable.

In such case the appraisal shall be made according to the number so indicated.

Rule 14. Articles which, by reason of their nature or their application, are composed of two or more materials or of different parts, as, for instance, the handle of an implement and the implement itself; the glass and frame of a mirror, shall, for the total weight, be taxed according to the material chiefly determining the value of the article.

Rule 15. That each and every imported article, not enumerated in this act, which is similar, either in material, quality, texture, or the use to which it may be applied, to any article enumerated in this act as chargeable with duty, shall pay the same rate of duty which is levied on the enumerated article which it most resembles in any of the particulars before mentioned; and if any nonenumerated article equally resembles two or more enumerated articles in which different rates of duty are chargeable, there shall be levied on such nonenumerated article the same rate of duty as is chargeable on the article which it resembles paying the highest rate of duty; and on articles not enumerated, manufactured of two or more materials, the duty shall be assessed at the highest rate at which the same would be chargeable if composed wholly of the component material thereof of chief value; and the words "component material of chief value," wherever used in this act, shall be held to mean that component material which shall exceed in value any other single component material of the article; and the value of each component material shall be determined by the ascertained value of such material in its condition as found in the article. If two or more rates of duty shall be applicable to any imported article, it shall pay duty at the highest of such rates.

### Packing.

#### REGULATIONS TO BE APPLIED TO LEVYING DUTY ON PACKING, PACKAGES AND RECEPTACLES.

Rule 16. Common packing, packages, receptacles and coverings of imported merchandise in use and imported with such merchandise, shall be dutiable under their corresponding paragraphs of the tariff except in the case of goods dutiable by gross weight or ad valorem.

Rule 17. In all cases in which dutiable merchandise shall by its tariff number be dutiable upon the gross weight, the dutiable weight of such merchandise shall include the weight of all covers, receptacles, wrappers, packages and packing of every description, whether exterior, interior or immediate, without any allowance for tare.

Rule 18. In all cases in which dutiable merchandise shall by its tariff number be dutiable upon net weight, the dutiable weight of such merchandise shall not include the weight of any common exterior cover, receptacle, package, wrappers or packing, but shall include all interior or immediate receptacles.

Rule 19. When in a single receptacle are imported goods dutiable by net weight, together with others dutiable by gross weight, the former shall be assessed by their net weight in accordance with the preceding Rule No. 18; and the latter shall be assessed, together with the weight of the entire exterior receptacle; or, in case there should be more than one class of goods dutiable by gross weight, they shall be assessed together with the weight of the entire exterior receptacle proportionately divided between them in accordance with their respective net weights.

In the case of goods dutiable by net weight packed together with goods dutiable by unities, the former shall be assessed as above described, and the latter shall pay by unities; the exterior receptacle will then be dutiable by its corresponding paragraph. For the purposes of this rule, goods dutiable ad valorem and goods free of duty shall be considered and appraised as by net weight.

Rule 20. Where merchandise, dutiable upon its net weight, where not otherwise specially provided for, is customarily contained in packing, packages or receptacles of uniform or similar character, it shall be the duty of the Collector of the Islands from time to time to ascertain by tests the actual weight or quantity of such merchandise and the actual weight of the packages, packing or receptacles thereof, respectively. In which such merchandise is customarily imported, and, upon such ascertainment, to prescribe regulations for estimating the dutiable weight or quantity of such merchandise, and thereafter such merchandise imported in such customary packing, packages and receptacles shall be entered, and the duties thereon levied and collected, upon the basis of such estimated dutiable weight or quantity.

### Weights and Measures.

Sec. 7. The following abbreviations shall be employed in the tariff: G. W.—gross weight. N. W.—net weight. Hectog.—hectogram. Kilo.—kilogram. Kilos.—kilograms. Hectol.—hectoliter.

Sec. 8. Duties shall be paid in United States money except that:

The following coins now in circulation in the Philippine Islands shall be received for customs duties and taxes at the following rates in money of the United States: Peso, 50 cents; Medio Peso, 25 cents; Peseta, 10 cents; Media Peseta, 5 cents. But such rates shall be changed in accordance with a quarterly proclamation of the civil governor.

Sec. 9. The metrical system of weights and measures as authorized by Sections 3569 and 3570 of the Revised Statutes of the United States and at present in use in the Philippine Islands, shall be continued.

The meter is equal to 39.37 inches.

The liter is equal to 1.0567 quarts, wine measure.

The kilogram is equal to 2.2046 pounds avoirdupois.

Sec. 10. Importations from the United States are dutiable under the provisions of this act, but no customs duties shall be imposed on articles, goods or merchandise transported only from one place or port to another place or port in the Philippine Islands.

### The Metal Schedule.

#### GROUP 1.—GOLD, SILVER AND PLATINUM, AND ALLOYS OF THESE METALS, AND GOLD AND SILVER PLATE.

27. Gold and platinum or alloys thereof: (a) In jewelry, plate and goldsmiths' wares, not otherwise provided for, N. W., hectog. \$12.50; (b) same set with pearls or precious stones, not otherwise provided for, N. W., hectog., \$25; (c) same set with doublets, imitation precious stones or imitation pearls, N. W., hectog., \$17.50; (d) same manufactured into articles other than jewelry or plate, except as otherwise specially provided, N. W., hectog., \$3.

28. Silver: (a) In jewelry or plate and silversmiths' wares, not set with pearls or precious stones, N. W., hectog., \$3; (b) in same set with pearls or precious stones, N. W., hectog., \$15.50; (c) in same set with doublets, imitation precious stones or imitation pearls, N. W., hectog., \$8; (d) silver manufactured into articles other than jewelry or plate, N. W., hectog., \$0.80.

29. Gold and silver plated ware: (a) Gold and silver plated jewelry, N. W., kilo., \$2.40; (b) gold and silver plated wares other than jewelry, N. W., kilo., \$2.

Provided, that none of the articles classified under paragraphs 27, 28 and 29 shall pay a less rate of duty than 20 per cent. ad valorem.

#### GROUP 2.—CAST IRON.

Articles of malleable cast iron are dutiable as manufactures of wrought iron.

30. Pigs, G. W., 100 kilos., \$0.10.

31. Articles not coated or ornamented with another metal or porcelain, neither polished nor turned: (a) Bars, beams, plates, grates for furnaces, columns and pipes, G. W., 100 kilos., \$0.35; (b) lubricating boxes for railway trucks and carriages and railway chairs, G. W., 100 kilos., \$0.30; (c) articles, other, not elsewhere mentioned, G. W., 100 kilos., \$0.75.

32. Articles of all kinds not coated or ornamented with another metal or porcelain, either polished or turned, N. W., 100 kilos., \$1.20

33. Articles of all kinds, enameled, bronze gilt, tinned or coated, or ornamented with other metals or porcelain, N. W., 100 kilos., \$2.

#### GROUP 3.—WROUGHT IRON AND STEEL.

34. Iron, soft or wrought, in ingots or "tochos," steel in ingots, G. W., 100 kilos., \$0.24.

35. Wrought iron or steel, rolled: (a) Rails, G. W., 100 kilos., \$0.30; (b) bars and beams, neither perforated, riveted, with screws, not cut to measure, of all kinds (excepting fine crucible steel), including rods, tires and hoops, G. W., 100 kilos., \$0.60 (the rods in question are iron or steel rods exceeding 8 mm. in thickness, employed in the manufacture of iron wire); (c) the same, of crucible steel, G. W., 100 kilos., \$1.05. Crucible steel is distinguishable from bar and other pieces of iron or common steel by its sharp edges. The surface is very smooth, of a bluish color darker than that of iron, and its fracture is close grained. (This steel is generally imported in round, triangular, square, octagonal or flat bars.)

36. Wrought iron and steel sheets, rolled: (a) Neither polished nor tinned, of 3 mm. and more in thickness, G. W., 100 kilos., \$0.78; (b) neither polished nor tinned, of less than 3 mm. in thickness, and hoop iron, G. W., 100 kilos., \$0.78 (by hoop iron (flegs) shall be understood unpolished, flat bands or circles less than 3 mm. in thickness); (c) tinned and tin plate, G. W., 100 kilos., \$1; (d) polished, corrugated, perforated, cold rolled, galvanized or not, and bands of polished hoop iron, G. W., 100 kilos., \$0.90.

37. Wrought iron or steel: Cast in pieces in the rough, neither polished, turned nor adjusted, weighing each: (a) 25 kilos. or more, G. W., 100 kilos., \$0.75; (b) less than 25 kilos., G. W., 100 kilos., \$1.

38. Wrought iron or steel cast in pieces, finished: (a) Wheels weighing more than 10 kilos., fish plates, chairs, sleepers and straight axles; springs for railways and tramways; lubricating boxes, G. W., 100 kilos., \$0.45; (b) wheels weighing 100 kilos. or less; springs other than for railways and tramways; bent axles and cranks, G. W., 100 kilos., \$1.05.

39. Wrought iron or steel pipes: (a) Covered with sheet brass, G. W., 100 kilos., \$1.40; (b) other, galvanized or not, G. W., 100 kilos., \$1.05.

40. Wrought iron or steel wire, galvanized or not: (a) 2 mm. or more in diameter, N. W., 100 kilos., \$0.75; (b) more than  $\frac{1}{2}$  mm. and less than 2 mm. in diameter, N. W., 100 kilos., \$1; (c)  $\frac{1}{2}$  mm. or less in diameter and wire covered with a textile, N. W., 100 kilos., \$1.40.

41. Wrought iron or steel in large pieces composed of bars or bars and sheets fastened by means of rivets or screws; the same unriveted, perforated or cut to measure for bridges, frames and other buildings, G. W., 100 kilos., \$1.

42. Anchors, iron or steel plates for vessels, chains for vessels or machines, moorings, switches and signal disks, G. W., 100 kilos., \$0.50.

43. Anvils, G. W., 100 kilos., \$1.75.

44. Wire gauze: (a) Up to 40 threads per square inch, N. W., 100 kilos., \$1.75; (b) of 40 threads or more per square inch, N. W., kilo., \$0.04.

45. Cables, fencing (barbed wire), netting, furniture springs, N. W., 100 kilos., \$0.75.

46. Tools and implements, not apparatus, of wrought iron or steel: (a) Fine, for arts, trades and professions, partly or wholly of crucible steel, N. W., 100 kilos., \$5; (b) other, N. W., 100 kilos., \$1.50. Provided, that none of the articles classified under this paragraph shall pay a less rate of duty than 15 per cent. ad valorem.

47. Screws, nuts, bolts, washers and rivets, N. W., 100 kilos., \$2.

48. Nails, clasp nails, tacks and brads, N. W., 100 kilos., \$1.

49. Saddlery hardware: (a) Common, made of iron or steel, common bits, spurs, and all finishes of common harness, not nickelized or covered with other metals or materials, N. W., 100 kilos., \$3; (b) the same ornamented, nickelized or covered with other materials, N. W., 100 kilos., \$6.

50. Buckles, not gold or silver plated: (a) Bronze gilt, silvered or nickelized, N. W., kilo., \$0.20; (b) others, N. W., kilo., \$0.15.

51. Sewing and embroidery needles, pens, N. W., kilo., \$0.30.

52. Common pins, hooks and eyes, N. W., kilo., \$0.30.

53. Crochet hooks and the like, hair pins, N. W., kilo., \$0.30.

54. Cutlery: (a) Butchers', shoemakers', saddlers', kitchen, bread, vegetable, cheese, plumbers' and painters' knives, with wood handles, table knives and forks, with wood handles, scissors and shears, with glazed or japanned bows, N. W., kilo., \$0.15; (b) pocket cutlery, side arms (not fire), and parts for the foregoing; razors, N. W., kilo., \$0.60; (c) pruning and budding knives, grass, garden, hedge, pruning and sheep shears, N. W., kilo., \$0.05; (d) surgical and dental instruments, fishing hooks and all other cutlery, including scissors and shears not otherwise provided for, N. W., kilo., \$0.30.

Provided, that none of the articles classified under paragraphs 51, 52, 53 and 54 shall pay a less rate of duty than 15 per cent. ad valorem.

55. Small arms and barrels: (a) Barrels, unfinished, for portable arms, N. W., kilo., \$0.25; (b) barrels, finished, for portable arms, N. W., kilo., \$0.60; (c) pistols and revolvers, also their detached parts, except barrels, N. W., kilo., \$3.

56. Other arms, breech and muzzle loading, and detached parts thereof, except barrels, N. W., kilo., \$2.

57. Manufactures of tin plate, N. W., 100 kilos., \$5.

58. Wrought iron or steel in common articles of all kinds not specially mentioned, though coated with lead, tin or zinc, or painted or varnished, N. W., 100 kilos., \$2.50.

59. Wrought iron or steel in articles of all kinds not specially mentioned, fine—i.e., polished, enameled, coated with porcelain, nickel or other metals (with the exception of lead, tin, zinc, gold or silver), or with ornaments, borders or parts of other metals (except gold or silver), or combined with glass or earthenware, N. W., 100 kilos., \$4. Provided, that none of the articles classified under this paragraph shall pay a less rate of duty than 13 per cent. ad valorem.

#### GROUP 4.—COPPER AND ALLOYS OF COMMON METALS WITH COPPER (BRASS, BRONZE, ETC.).

60. Copper scales (laminæ), copper of first fusion, old copper, brass, &c., G. W., 100 kilos., \$1.50.

61. Copper and alloys of copper; in ingots, G. W., 100 kilos., \$2.

62. The same rolled in bars of all kinds, G. W., 100 kilos., \$2.25.

63. The same rolled in sheets, G. W., 100 kilos., \$2.50.

64. The same in wire, galvanized or not: (a) 1 mm. or more in diameter, N. W., 100 kilos., \$4.50; (b) less than 1 mm. in diameter, N. W., 100 kilos., \$4.50; (c) silvered or nickelized, N. W., kilo., \$0.35.

65. The same in wire, covered with textiles, not elsewhere provided for, or with insulating materials, cables for conducting electricity over public thoroughfares, N. W., 100 kilos., \$5.

66. The same in wire gauze: (a) Up to 200 threads per inch, N. W., kilo., \$0.04; (b) of 200 threads or more per inch, N. W., kilo., \$0.10.

67. The same in pipes, bearings, plates for fire places and boiler makers' wares, partially wrought, G. W., 100 kilos., \$3.25.

68. The same in nails and tacks, crochet hooks, pins, pens and hair pins: (a) Nails and tacks, bronze gilt or nickelized, N. W., kilo., \$0.20; (b) nails and tacks, other, N. W., kilo., \$0.05; (c) pins, pens, crochet hooks, hair pins, N. W., kilo., \$0.30.

69. Copper and alloys of copper: (a) In articles not specially mentioned, varnished or not, N. W., kilo., \$0.15; (b) in articles of bronze gilt or nickelized, not specially mentioned, except when exclusively used for sanitary constructions, N. W., kilo., \$0.50; (c) in articles of bronze gilt or nickelized, when exclusively used for sanitary constructions, N. W., kilo., \$0.20.

By "sanitary constructions" are meant the fixtures, fittings and attachments such as pipes, valves, drains, spigots, basins, faucets and douches used in modern sanitary house plumbing and for bathrooms. Provided, that none of the articles classified under this paragraph shall pay a less rate of duty than 15 per cent. ad valorem.

#### GROUP 5.—OTHER METALS AND THEIR ALLOYS.

70. Mercury, G. W., kilo., \$0.10.

71. Nickel, aluminum and their alloys: (a) In lumps or ingots, G. W., 100 kilos., \$4; (b) in bars, sheets, pipes and wire, N. W., 100 kilos., \$6; (c) in other articles of all kinds, N. W., kilo., \$0.10.

72. Tin and alloys thereof: (a) In lumps or ingots, G. W., 100 kilos., \$2; (b) in bars, sheets, pipes and wire, N. W., 100 kilos., \$3.50; (c) hammered in thin leaves (tin foil) and capsules for bottles, N. W., kilo., \$0.05.

73. Zinc, lead and other metals, not specially mentioned, as well as their alloys: (a) In lumps or ingots, G. W., 100 kilos., \$0.50; (b) in bars, sheets, pipes and wire, including shot, G. W., 100 kilos., \$0.75; (c) articles bronze gilt or nickelized, except when exclusively used for sanitary construction, N. W., kilo., \$0.50; (d) zinc nails and tacks, neither bronze gilt nor nickelized, N. W., kilo., \$0.06; (d) in other articles, including type, N. W., kilo., \$0.15. Provided, that none of the articles classified under this paragraph shall pay a less rate of duty than 15 per cent. ad valorem.

#### GROUP 6.—WASTES AND SCORLE.

74. Filings, shavings, cuttings of iron and steel and other wastes of cast iron or from the manufacture of common metals, fit only for remelting, G. W., 100 kilos., \$0.15.

75. Scorle resulting from the smelting of ores, G. W., 100 kilos., \$0.03.

#### Machinery.

##### GROUP 2.—APPARATUS AND MACHINERY.

242. Weighing machines: (a) Machinery and apparatus for weighing goods in bulk, N. W., 100 kilos., \$0.50; (b) platform scales and weights, and counter scales having platforms, and steelyards and detached parts of same, N. W., 100 kilos., \$3; (c) balance and spring scales, with weights and scoops, N. W., kilo., \$0.25.

243. Marine engines and steam pumps; hydraulic, petroleum, gas and hot or compressed air motors, N. W., 100 kilos., \$1.50.

244. Boilers: (a) Sheet iron, G. W., 100 kilos., \$0.50; (b) other, G. W., 100 kilos., \$0.75.

245. Agricultural machinery and apparatus, machinery and apparatus for pile driving, dredging, hoisting, making or repairing roads, for refrigerating and ice making, for making sugar, preparing rice or hemp, and other vegetable products of the islands for the markets, G. W., 100 kilos., \$0.25.

246. Locomotives, including tenders, and traction engines of all kinds using steam or other power, G. W., 100 kilos., \$1.

247. Turntables, hydraulic cranes and columns, G. W., 100 kilos., \$0.30.

248. Apparatus and appliances (not machinery) for electric lighting and power: (a) Switches, cut outs, lamp sockets, shade holders, rosettes, plugs, brushes of copper and carbon, wet and dry batteries complete, tapes and compounds for winding wires, testing sets, testing bells for current, arc lamps and fittings for same, fuse boxes, insulating coils, and all insulating materials not elsewhere expressly provided for, N. W., 100 kilos., \$3; (b) galvanometers, ampermeters, voltmeters, N. W., 100 kilos., \$2.50. Only articles used exclusively in the generation and distribution of electric currents for light or power shall be classed under this number.

249. Storage batteries for lighting or power, N. W., 100 kilos., \$2.50.

250. Dynamos, generators, exciters and all other machinery for the generation of electricity for lighting or for power, also transformers, N. W., 100 kilos., \$5.

251. Sewing machines and detached parts thereof, N. W., 100 kilos., \$3.

252. Bicycles: (a) Complete, except lamps, each, \$5; (b) detached parts and accessories thereto, including lamps, N. W., kilo., \$0.30.

253. Velocipedes, each, \$2.

254. Typewriters and phonographs, each, \$4.

255. Cash registers, kilo., \$0.25.

256. Automatic slot machines: (a) For weighing, N. W., kilo., \$0.50; (b) others, not prohibited, N. W., kilo., \$1.25.

257. Other machinery and detached parts not otherwise provided for: (a) Of copper and its alloys, N. W., 100 kilos., \$4; (b) of other material, N. W., 100 kilos., \$1.

Provided, that none of the articles classified under paragraphs 252, 253, 254, 255, 256 and 257 shall pay a less rate of duty than 20 per cent. ad valorem.

There arrived last week in San Francisco harbor from Westport, on the Columbia River, near Portland, Ore., a raft containing 7,200,000 feet of lumber, equal to 15 good sized cargoes. The raft was towed by two Puget Sound tugboats and the trip was made without accident. A large force of men was employed for eight months in constructing the raft, which formed a cigar shaped mass 625 feet long, 60 feet broad and 32 feet deep, held together by 70 tons of chains. The timber is estimated to be worth about \$100,000.

# The Iron Age

New York, Thursday, October 10, 1901.

DAVID WILLIAMS COMPANY,	PUBLISHERS.
CHARLES KIRCHHOFF,	EDITOR.
GEO. W. COPE,	ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS,	HARDWARE EDITOR.
JOHN S. KING,	BUSINESS MANAGER.

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## A Two-Sided Proposition.

It seems to be assumed that at the approaching session of Congress an attack is to be made on the so-called trusts. The object of such an attack will, of course, be to so seriously cripple them that they will not be able to transact business in their present form, but will be obliged to dissolve. It would be absurd to suppose that they would be attacked for any other purpose. To adopt measures merely designed to reduce their profits would not by any means satisfy those who are clamoring for Governmental action. They want the trusts killed. It is unnecessary to enter into a discussion of the cause of this hostility to consolidated capital. Hostility to any approach to monopoly in any branch of business is inherent in the human breast. Even those who are interested in a trust are usually bitterly opposed to the organization of producers of any materials which they are obliged to purchase. No policy can be adopted by any trust which will conciliate the general public or disarm the opposition of those who are compelled to purchase its products. This opposition, however, can be misdirected and can be made the instrument of far more serious consequences than those which attend the limited period in which a trust exerts a controlling influence in its line.

The conviction forces itself on the judicial and disinterested mind that it is now too late for the adoption of measures designed to crush the trusts and force them out of existence. We have seen their number increase until scarcely a branch of productive industry can be named in which some powerful combination of capital has not been formed which controls a large percentage of the business. In some lines these combinations or consolidations represent a capitalization which is staggering in its colossal aggregation of figures, while the total amount of capital represented in all the trusts is too great for its magnitude to be comprehended by the finite mind. Puny efforts have been made by the legislatures of various States and by Congress to stay the movement which has resulted in the development of this new influence in manufactures and commerce, whose creators have thus far been able to overcome all obstacles thrown in their path. Gradually, conservative investors have been induced to purchase their stocks and other securities, the most prudently managed financial institutions have become interested in their flotation, and the stocks and bonds have acquired a sufficient standing to be accepted as collateral for loans by the most cautious money lenders. The result is that the operations of the trusts have now so permeated the great mass of business transacted in this country that it is appalling to contemplate the shock which would be administered to our financial fabric if suddenly all the certificates of stock, all the bonds, all the notes and all the other obligations of these great corporations should be made worthless by some ingeniously conceived national legislation. The worst financial panic in our

checkered business history would be a mild zephyr compared with the cyclone of disaster which would follow such an act. Men who have scrupulously avoided all investments in trusts and whose business is absolutely independent of connection with them would not be able to escape the fury of such a financial cataclysm. All business would be paralyzed and practically universal ruin would be entailed on the country.

From present appearances it would seem that political considerations are prompting party leaders to take active steps in promoting legislation to kill the trusts. These leaders should weigh well the consequences before engaging in such a disastrous campaign if they are really in earnest and believe they can successfully accomplish their purpose. The people are usually well able to discriminate between right and wrong, but when they urge the adoption of measures which they fail to see will lead to financial disaster, and find themselves in distress as a result of such measures, they turn and rend their leaders. It is the wise man who resists clamor and endeavors to make his neighbors listen to reason. The country will suffer much less if the trusts are now allowed to run their course and work out their own salvation than if they were suddenly to be legislated out of existence.

## The Earnings of the United States Steel Corporation.

The recent report of the earnings of the United States Steel Corporation for the first six months of their existence has brought out a flood of comment and commendation. Yet the figures have been received by many with a reserve bordering on disbelief, chiefly because the earnings for August and September failed to show any falling off as the result of the strike. No official explanation of the data presented was given, but we understand that the earnings of the months affected by the strike would have been very much larger but for that struggle. The earnings of the United States Steel Corporation are the aggregate of the profits made by the constituent interests. A preliminary estimate is made by each of these concerns on the basis of the actual returns for the first 25 days of the month, and this was the figure adopted for September. Past experience has shown that the methods of accounting are so complete that, barring accidents, the preliminary figures vary but very little from the final returns. The earnings of the constituent companies are based on the shipments of product. Therefore the concerns affected by the strike who continued to ship product from stock continued to show earnings even after they had largely ceased production.

A peculiarly interesting point in connection with the figures submitted, however, is that the earnings of the ore mining and transportation interests were particularly heavy during the months when a part of the finishing capacity was idle. There went into the earnings, therefore, the profits on hauling by railroad and transporting by the lakes ore which will not enter into the manufacture of iron for months to come. The earnings of the United States Steel Corporation will be swelled during the season of navigation by those shipments and it was the returns from this source which went far toward obscuring the effect of the strike. Of course the tonnage of finished material which it was impossible to deliver owing to idleness will go to increase the receipts during the winter period, when usually the demand is somewhat slack.

### The Condition of the Brooklyn Bridge.

The engineers appointed by the District Attorney to examine and report upon the condition of the Brooklyn Bridge have finished their work. The investigation covers the entire bridge between the anchorages and reveals a state of affairs not even suspected by either engineers or laymen. It shows that the bridge has been shamefully neglected by those responsible for its well being, and that the engineers believe "the present methods of supervision, inspection and maintenance to be very faulty and not such as will with any certainty keep the bridge in a safe condition." The bridge is now practically as strong as when completed, but, while the moving loads are 40 per cent. in excess of those proposed by the designer, his estimate of the weight of the structure was so much in excess of its actual weight that the combined dead and live load is now less than 3 per cent. greater than that calculated by him. But this increased moving load exerts a greater effect on certain parts of the bridge than on others, and, therefore, the safety of the structure has been reduced far below that contemplated by the designer. It is pronounced "that the stresses in cables, towers, parts of stay system and floors, due to the most unfavorable probable combination of forces, are far in excess of those considered good and adequately safe by engineers."

The cables are under excessive stress at the center hinge or joint, and the strength of the stay system is greatly reduced by the weakness of its end connections. Eliminating the load carried by the stays, the cables are under a strain of 71,000 pounds per square inch, which is about 18 per cent. in excess of what the engineers regard as the permissible working stress, 60,000 pounds. The report presents a method for the better distribution of the load at the center.

The saddles at the top of the towers, which carry the cables, are at present immovable, and under these conditions the pressure existing in the masonry is at least 39.6 tons per square foot, when it should not be more than 20 tons. Making the saddles movable would reduce this pressure to 35 tons, but would, at the same time, increase the stresses in the cables from bending. These are already too high and are not accurately known. A plan is suggested for reducing the pressure in the masonry and for lessening the stresses in the cables and anchorages "to an extent sufficient to permit strengthening the floors and increasing the moving loads by relaxing the restrictions on spacing of trolley cars, without harm to the bridge from the resulting additions to its weight."

The report proves conclusively that one of the most useful and grandest bridges on earth has been severely let alone by those whose sole duty it was to take care of it. It protested against this treatment in an emphatic way last July. Considered as a chain with the proverbial weak link, it is at present unsafe. Changes which would increase its safety are pronounced emphatically necessary and should be begun at once. With a knowledge of the way things are done in the great city of New York, it is very doubtful if a single step is taken toward the improvement of the bridge for months to come.

At the International Congress for Testing Materials at Budapest three Americans took an active and effective part. They were Prof. H. M. Howe of Columbia University, Dr. Moldenke, secretary of the American Foundrymen's Association, and Walter Wood of R. D. Wood & Co., Philadelphia. After considerable discussion resolutions were passed instructing the various committees

having the testing of iron and steel in charge to draw up and present at the next congress International specifications for the leading articles.

### The Mineral Production of the United States

According to a report issued recently by the United States Geological Survey, the total value of minerals of all kinds produced in the United States in 1900 was \$1,070,108,899. The total production for 1899 was \$1,211,361,861, and for 1898 \$861,751,017. The total value of the metallic products was \$552,418,627, the nonmetallic \$516,690,262, and estimated value of mineral products, unspecified, \$1,000,000.

Among the more important minerals there were 13,789,242 long tons of pig iron produced in 1900, with a value of \$259,944,000, as against 13,400,735 long tons in 1899 and a value of \$234,725,754. There was a total of 363,735,265 tons of coal, anthracite and bituminous, with a value of \$306,890,364, as against 252,115,387 tons, valued at \$276,147,056, in 1899.

There was a very perceptible increase in 1900 of the production of the precious metals. The output of gold increased from 3,391,196 troy ounces, valued at \$70,096,021, in 1899, to 3,837,215 troy ounces, valued at \$79,322,281, last year. The production of silver was 57,126,834 troy ounces, valued in the market at \$34,036,168, in 1899, while in 1900 59,610,543 troy ounces, with a coinage value of \$77,070,471, were produced.

The other figures, as officially announced, were as follows:

Copper, 606,117,166 pounds; value at New York City, \$98,494,039.  
Lead, 270,824 short tons; value at New York City, \$23,561,688.  
Zinc, 123,886 short tons; value at New York City, \$10,654,196.  
Quicksilver, 28,317 flasks; value at San Francisco, \$1,302,586.  
Aluminum, 5,200,000 pounds; value at Pittsburgh, \$1,716,000.  
Antimony, 1750 short tons; value at San Francisco, \$346,980.  
Nickel, 9715 pounds; value at Philadelphia, \$3886.  
Platinum, 400 troy ounces; value (crude) at San Francisco, \$2500.

The nonmetallic minerals, with spot values, follow:

Bituminous coal, 212,513,012 short tons; value, \$221,133,513.  
Pennsylvania anthracite, 51,221,353 long tons; value, \$85,757,851.  
Natural gas, value, \$23,606,463.  
Petroleum, 63,362,704 barrels; value, \$75,752,691.  
Brick clay, value, \$12,000,000.  
Cement, 17,225,131 barrels; value, \$13,279,167.  
Stone, value, \$47,958,539.  
Corundum and emery, 4305 short tons; value, \$102,715.  
Garnet (abrasive), value, \$123,475.  
Grindstones, value, \$701,121.  
Infusorial earth and tripoll, 3615 short tons; value, \$24,207.  
Millstones, value, \$32,858.  
Oilstones, value, \$181,011.  
Borax, refined, 1602 tons; value, \$170,036. Borax, crude, 24,235 tons; value, \$848,215.  
Bromine, 521,444 pounds; value, \$140,790.  
Fluorspar, 18,450 short tons; value, \$94,500.  
Gypsum, 594,462 short tons; value, \$1,627,203.  
Marls, 60,000 short tons; value, \$30,000.  
Phosphate rock, 1,491,216 long tons; value, \$5,359,248.  
Pyrite, 204,615 long tons; value, \$749,991.  
Salt, 20,869,342 barrels; value, \$6,944,603.  
Sulphur, 3525 short tons; value, \$88,100.  
Barites, 67,680 short tons; value, \$188,080.  
Cobalt oxide, 6471 pounds; value, \$11,648.  
Mineral paints, 72,222 short tons; value, \$881,363.  
Zinc white, 48,840 short tons; value, \$3,667,210.  
Asbestos, 1054 short tons; value, \$16,310.  
Asphaltum, 68,429 short tons; value, \$491,598.  
Bauxite, 23,184 long tons; value, \$89,676.  
Chrome iron ore, 140 long tons; value, \$1400.  
Clay (all other than brick), value, \$1,840,377.  
Feldspar, 21,563 short tons; value, \$173,659.  
Fibrous talc, 63,500 short tons; value, \$409,500.  
Flint, 32,495 short tons; value, \$179,351.  
Fuller's earth, 9698 short tons; value, \$67,535.  
Graphite, crystalline, 5,507,855 pounds, and amorphous, 611 tons; total graphite value, \$197,579.  
Limestone for iron flux, 7,495,435 long tons; value, \$4,500,000.  
Magnesite, 2252 short tons; value, \$19,333.  
Manganese ore, 11,771 long tons; value, \$100,289.  
Mica, 456,393 pounds of sheet; value, \$92,758, and scrap, 5453 tons; value, \$54,302.  
Mineral waters, 47,558,784 gallons sold; value, \$6,245,172.  
Monazite, 908,000 pounds; value, \$48,805.  
Precious stones, value, \$233,170.  
Rutile, 300 pounds; value, \$1300.  
Soapstone, 27,943 short tons; value, \$383,541.

### The Standardization of Extra Heavy Flanges.

Steam pressures varying from 100 to 250 pounds pressure entered into engineering practice about the year 1889. For pressures less than 100 pounds there had long existed confusion regarding standards for flanges of pipe, fittings and valves. A schedule of standard flanges was adopted July 18, 1894, by a committee of the Master Steam and Hot Water Fitters' Association, a committee of the American Society of Mechanical Engineers, and the representatives of the leading valve and fitting manufacturers of the United States. As the use of high steam pressures became more general there came into existence so many different diameters, thicknesses, drilling circles and number of bolts for flanges on fittings, valves and pipe for extra heavy pressures that manufacturers could not safely keep stocks of goods, and mill architects and engineers were greatly delayed at times in making up specifications for contemplated work on account of time taken to find out what the different manufacturers could or would furnish.

Recognizing the need of a standard for extra heavy, J. C. Meloon, mechanical superintendent of the General Fire Extinguisher Company, Providence, R. I., issued an invitation to the leading valve and fitting concerns of the country to meet and consider this subject. In response to this invitation several of the largest concerns sent representatives to a meeting at New York City April 24, 1901. At that meeting a committee was chosen to formulate a standard. This committee consisted of J. C. Meloon, mechanical superintendent, General Fire Extinguisher Company, Providence, R. I.; J. F. O'Brien, secretary, the Pratt & Cady Company, Hartford, Conn.; L. R. Greene, engineer, Walworth Mfg. Company, Boston, Mass.; H. D. Gordon, M.E., Jenkins Bros., New York, N. Y.; F. A. Strong, superintendent, Eaton, Cole & Burnham Company, Bridgeport, Conn.; F. A. Connet, engineer, Builders Iron Foundry, Providence, R. I. Mr. Meloon was made chairman and Mr. O'Brien secretary.

The committee had various sessions, and submitted to the manufacturers interested the following recommendations and schedule for standard at a meeting held in New York City June 28, 1901:

#### I.

Multiples of four for drilling.

#### II.

Drilling should straddle vertical axis.

#### III.

Bolt centers not to exceed  $3\frac{1}{8}$  inches, except on  $2\frac{1}{2}$ -inch size. Committee at first proposed eight  $\frac{5}{8}$ -inch bolts, but sample elbows and flanges were drilled and bolted together, and it was found that eight  $\frac{5}{8}$ -inch bolts interfered with inserting bolts.

#### IV.

Distance from center of bolt to edge of the flange should always equal or exceed the diameter of bolt plus  $\frac{1}{4}$  inch for 9-inch valves and under, and diameter of bolt plus not less than  $\frac{1}{4}$  inch for sizes larger.

#### V.

Size of pipe. Inches.	Diameter of flange, Inches.	Thickness of flange, Inches.	Diameter of bolt circle, Inches.	Number of bolts.	Size of bolts, Inches.
2	$6\frac{1}{2}$	$\frac{7}{8}$	5	4	$\frac{5}{8}$
2 $\frac{1}{2}$	$7\frac{1}{2}$	1	$5\frac{1}{2}$	4	$\frac{5}{8}$
3	$8\frac{1}{4}$	$1\frac{1}{8}$	$6\frac{1}{8}$	8	$\frac{5}{8}$
3 $\frac{1}{2}$	9	$1\frac{3}{16}$	$7\frac{1}{2}$	8	$\frac{5}{8}$
4	10	$1\frac{1}{4}$	$7\frac{1}{2}$	8	$\frac{5}{8}$
4 $\frac{1}{2}$	$10\frac{1}{2}$	$1\frac{5}{16}$	$8\frac{1}{2}$	8	$\frac{5}{8}$
5	11	$1\frac{1}{8}$	$9\frac{1}{4}$	8	$\frac{5}{8}$
6	$12\frac{1}{2}$	$1\frac{7}{16}$	$10\frac{1}{2}$	12	$\frac{5}{8}$
7	14	$1\frac{1}{2}$	$11\frac{1}{8}$	12	$\frac{5}{8}$
8	15	$1\frac{1}{8}$	13	12	$\frac{5}{8}$
9	16	$1\frac{1}{8}$	14	12	$\frac{5}{8}$
10	$17\frac{1}{2}$	$1\frac{1}{4}$	$15\frac{1}{4}$	16	$\frac{5}{8}$
12	20	2	$17\frac{1}{4}$	16	$\frac{5}{8}$
14	$22\frac{1}{2}$	$2\frac{1}{8}$	20	20	$\frac{7}{8}$
15	$23\frac{1}{2}$	$2\frac{3}{16}$	21	20	1
16	25	$2\frac{1}{4}$	$22\frac{1}{2}$	20	1
18	27	$2\frac{1}{8}$	$24\frac{1}{2}$	24	1
20	$29\frac{1}{2}$	$2\frac{1}{4}$	$26\frac{1}{4}$	24	$1\frac{1}{4}$
22	$31\frac{1}{2}$	$2\frac{1}{8}$	$28\frac{1}{4}$	28	$1\frac{1}{8}$
24	34	$2\frac{1}{4}$	$31\frac{1}{4}$	28	$1\frac{1}{8}$

#### VI.

The bolt circle diameters, as above stated, will allow the use of calking recess on pipe flanges, provided such device is specified.

The schedule presented was unanimously adopted by the manufacturers present, and January 1, 1902, was the date set for its adoption.

The following firms have agreed to adopt the standard and put it into effect January 1, 1902:

The Eaton, Cole & Burnham Company, Bridgeport, Conn.  
Chapman Valve Mfg. Company, Indian Orchard, Mass.  
Walworth Mfg. Company, Boston, Mass.  
Crane Company, Chicago, Ill.  
The Pratt & Cady Company, Hartford, Conn.  
Jenkins Bros., New York City.  
General Fire Extinguisher Company, Providence, R. I.  
Builders Iron Foundry, Providence, R. I.  
Jarecki Mfg. Company, Erie, Pa.  
Crosby Steam Gage & Valve Company, Boston, Mass.  
The Kennedy Valve Mfg. Company, New York City.  
The Ludlow Valve Mfg. Company, Troy, N. Y.  
The Lunkenhelmer Company, Cincinnati, Ohio.  
The Michigan Brass & Iron Works, Detroit, Mich.  
The Kelly & Jones Company, New York City.  
Eastford Wire Mfg. Company, Belleville, N. J.  
National Tube Company, Pittsburgh, Pa.  
Coffin Valve Company, Boston, Mass.  
Rensselaer Mfg. Company, Troy, N. Y.  
The Mason Regulator Company, Boston, Mass.  
McNab & Harlin Mfg. Company, New York City.  
The John Davis Company, Chicago, Ill.  
Watson & McDaniel Company, Philadelphia, Pa.  
Ross Valve Company, Troy, N. Y.  
Edward P. Bates, Syracuse, N. Y.

The following firms will furnish to standard if desired by their customers:

Best Mfg. Company, Pittsburgh, Pa.  
Pittsburgh Valve, Foundry & Construction Company, Pittsburgh, Pa.  
Eddy Valve Company, Waterford, N. Y.

The committee's labors were very much lightened by the hearty co-operation of all the firms with whom they held communication, and the list of firms mentioned, embracing the largest manufacturers of valves and fittings in the East and West, shows the interest taken in the subject. A limited number of the schedules will be printed by the committee and copies may be obtained of the secretary, J. F. O'Brien, P. O. Drawer No. 66, Station A, Hartford, Conn.

### A New Steel Plant at Birmingham.

BIRMINGHAM, ALA., October 8, 1901.—(By Telegraph)—Prominent officials of the Republic Iron & Steel Company are here to decide upon the question of erecting a steel mill. With them is an expert from Pittsburgh of international reputation, who comes as adviser to the company officials. There is great probability that the mill will be built at Thomas. Its cost will be fully \$1,500,000. Circumstances justify the assumption that the mill is an assured fact. Other industries of large capacity will now mature. The future of Birmingham never looked brighter than it does at present.

J. M. K.

**A Test of Ajax Plastic Bronze.**—On the hot bar mill of Hughes & Patterson of Philadelphia a comparative test of bronze and brass was recently made. At one end Ajax plastic bronze, made by the Ajax Metal Company of Philadelphia, was placed, and on the other end phosphor bronze brass. The record of this test is as follows: November 15, 1900, brasses placed in position measured  $\frac{5}{8}$  inch in thickness; February 27, 1901, brasses taken out, phosphor bronze then measured  $\frac{3}{8}$  inch, and plastic bronze  $\frac{5}{8}$  inch; February 27, 1901, new phosphor bronze brass placed, original plastic bronze bearing being used; April 29, 1901, again taken out; second phosphor bronze bearing worn down to useful limit,  $\frac{3}{8}$  inch, while plastic bronze still measured 7-16 inch.

The Ohio Rolling Mill Company, at Findlay, Ohio, have requested President Shaffer of the Amalgamated Association to send the concern 12 puddlers, to whom they will guarantee steady work at Amalgamated scale wages until June 30 of next year.

**OBITUARY.**

M. T. MILES.

Moses T. Miles, who was one of the pioneers in representing iron manufacturers in the West, died in Chicago on September 24, aged 78 years. Mr. Miles began his career in the iron trade at a date when Chicago was practically the Western terminus of the railroad development of the country. He was born in Lee, Oneida County, N. Y., April 15, 1823. His first visit to the West was made in 1849, representing D. R. Barton, now the Barton Tool Company of Rochester, N. Y. At that time Mr. Miles was also conducting a business on his own account as a manufacturer of hickory handles and other bent hardwood. The panic of 1857 caused him to discontinue this business, and in 1858 he became the representative of Graff, Bennett & Co., then prominent Pittsburgh iron manufacturers, making his headquarters in Chicago. This brought him into close relations with all jobbers of iron and steel as well as the large consuming interests in the West. He continued to represent Graff, Bennett & Co. for an unbroken period of 31 years. During a portion of this time, from 1865 to the great fire of



M. T. MILES.

1871, he was also connected in business as a jobber with the late John M. Williams and others. The depression following the fire caused a severance of these relations. For 25 years, almost continuously, he also represented Anderson & Co., steel manufacturers of Pittsburgh, and their successors. He was further identified with iron manufacturing interests in such lines as chains and other heavy hardware. He continued actively engaged in the iron trade until about a year ago. Being a man of great energy and retaining his health and faculties in a remarkable degree for his advanced years, it was with extreme reluctance that he consented to retire and enjoy the rest he had earned by his long and assiduous application to business. The immediate cause of his death was apoplexy.

Mr. Miles leaves three children, consisting of a daughter and two sons, Holton F. and George S. Miles. His son George was connected with him for many years in representing the interests of manufacturers, and is now engaged with the Crucible Steel Company of America.

HENRY W. CRAMP.

Henry W. Cramp, eldest son of Charles H. Cramp, and vice-president of the William Cramp & Sons' Ship & Engine Building Company of Philadelphia died October 3 at the Devon Inn, Devon, Pa. Mr. Cramp suffered from a complication of diseases. He was born in Philadelphia in 1851, and in 1870 he entered the machine

shops of the I. P. Morris Company as an apprentice, but owing to ill health was obliged to abandon that pursuit after a year, and on the advice of physicians went to sea for two years for the benefit of his health. When the Cramp Company leased the Erie Basin Dry Dock and established a New York office, Henry W. Cramp was placed in charge of it and held that position as long as the company continued to operate the dry dock in New York. In 1886 he was elected secretary of the Cramp Company, to succeed his uncle, Theodore Cramp, who had previously held that position since the company were incorporated. On the reorganization of the company, May 12, 1891, he was made a director. Mr. Cramp then served continuously as secretary of the Cramp Company until June 6, 1895, when he was elected vice-president and treasurer, which position he held at the time of his death. Mr. Cramp was unmarried.

## NOTES.

CHARLES G. ZEHM, a widely known retired ironmaster of Kutztown, Pa., died October 4, aged 70 years.

GEORGE PLITT, aged 69 years, senior member of the firm of George Plitt & Sons, iron founders of Baltimore, Md., died on September 27 after a long illness. Mr. Plitt was a native of Germany and came to America when a boy. In 1873 he started in the foundry business in Baltimore, where he became a prominent business man, being actively connected with a number of financial and philanthropic institutions.

JOHN D. DAVIS, a prominent citizen of Cincinnati, Ohio, and a pioneer iron manufacturer, died on September 29 at his home at Oak Hill, Ohio, in his eightieth year. He came to the United States from Cardiganshire, Wales, in 1841, and was identified with pig iron manufacturing all his life. He was one of the original builders of the Jefferson Furnace, in Jackson County, Ohio, in 1853, and was its manager for 42 years, during all of which period the furnace was never operated a single Sunday, always closing down at midnight Saturday and starting again at midnight on Sunday.

THOMAS FLOWER, formerly a member of the old established brass and iron foundry firm of James Flower & Brother, Detroit, Mich., died September 29, at his home in that city, aged 78 years. He was born in Manchester, England, and came to this country in 1847, settling in Detroit.

RISWELL T. SMITH, whose inventions in mechanical engineering gave him an extensive reputation, died at Nashua, N. H., on October 5, aged 76 years.

The first mountain railway built upon the monorail system of Eugen Langen has been built upon the right bank of the River Elbe, opposite Dresden, and gives access to the well-known suburb of Blasewitz. This railway connects the valley of the Elbe, in which Loschwitz lies, with the Rochwitzer height, 328 feet above the valley station. This railway differs from the one between Barmen and Elberfeld, owing to the modifications in the Langen system necessary to fit the railway for a mountainous district. The cars are supported by, and swing freely from, a single rail carried upon strong framing; one rail acts as the upward track and a second as the downward track. By means of an endless rope, worked by a winding drum driven by one of two stationary engines, the ascending cars are connected with the descending cars, and each can have a follower coupled to it. The gradient is 1 in 3, and the railway is provided with a treble brake, consisting of one in the engine house to control the rope and two independent brakes, under the control of the conductor, upon each car.

The fire record of the United States and Canada for September, according to the New York *Journal of Commerce*, was unusually favorable, showing a total loss of \$7,645,200, against \$8,334,000 in the previous month, and \$9,110,000 in September, 1900. The year, so far, shows about \$16,000,000 less loss than for the same period of 1900, but is about \$21,000,000 worse than 1899.

### The New Power House at Niagara.

Power house No. 2 of the Niagara Falls Power Company begins to assume shape and size, making it possible for the many visitors at Niagara to get a grand conception of the marvelous nature of this work. The American Bridge Company have erected a goodly portion of the steel of the new station. The full length of this new station will be 560 feet. The width of the power house will be 70 feet, and in its construction practically the same beautiful architecture that has won such high favor in power house No. 1 will be carried out.

All of the excavation of the wheel pit has been completed except checks for some of the castings. This new wheel pit is 463 feet 8 inches long, while its width is 18½ feet and its depth 178½ feet. It will have an output capacity of 55,000 horse-power, the wheels to be of the Francis inward discharge type and work under a head of 145 feet. The extension of the main tunnel from the point where it was left off at the time wheel pit No. 1 was built around to wheel pit No. 2, a distance of between 600 and 700 feet, has been completed. This tunnel extension has been lined with brick throughout, the work corresponding to the lining of the original tunnel. Vitrified brick were used for eight courses and for the inverters, the remainder being of tunnel hards.

On the west side of the new wheel pit, at a depth of 138 feet, where the turbine deck is located, six chambers have been excavated. Each chamber is 18 feet wide, 21 feet high and 50 feet deep. They will be lined with brick to correspond with the wheel pit lining, and it is understood that the excitors, oil and air pumps will have place there.

The small tunnel connecting the old and the new wheel pits has been driven and has been partly lined with brick, the work now going forward. This tunnel is located at a depth of 130 feet below the surface, and in passing from pit to pit it runs under the inlet canal. Its purpose is to afford employees of the power company access from pit to pit without the necessity of ascending to the top to cross over. In length this tunnel is about 310 feet.

All of the masonry about the wheel pit has been completed with the exception of the line of arches for the forebay. This forebay is a new feature. It is located on the west side of the power house. It has a length of 460 feet and a width of 40 feet. The bottom is concreted for a depth of from 1 to 2 feet. The forebay will be covered. Running the length of the forebay there are 24 arches, the tops of which will be below the water line. Thus it is expected that the outer wall of the forebay will serve to keep back the floating ice in the inlet canal in winter time. In front of the present power house—that is, at the side of the inlet canal—the water of the canal flows along the racks, while at the new pit it will pass through the arches, the current striking full on the face of the racks, which are to be set about 10 feet back from the arches. This covered forebay will serve as a great protection in winter time, not only to the men working about the racks, but to the ice conditions in general.

In the construction of wheel pit No. 2 the same conditions of rock and water were met as in the construction of the first pit. In its depth the nature of the rock changes four times, while the inflow of water was practically the same. This rush of water was handled by the construction of a ring about 60 feet below the surface, into which the water flowed and was pumped to the surface. However, this ring will form a feature of the permanent construction, for it has been bricked in, and on the completion of the pit the water that runs into it will pass to a point below the turbine deck and be there discharged into the tunnel.

Three steam cranes have been installed in the power house for lowering men and material into the new wheel pit. One of these is the product of the Brown Hoisting Company of Cleveland, one is made by the American Hoist & Derrick Company of St. Paul and the third by the Industrial Works of Bay City, Mich. The two first mentioned are of 8-foot gauge, the Bay City crane being

of standard gauge in order that it may be used about the adjoining grounds.

William A. Breckenridge is resident engineer of the Niagara Falls Power Company in charge of the work, while Walter McCulloh is resident engineer of the National Contracting Company.

## MANUFACTURING.

### Iron and Steel.

The Boston Rolling Mills, owned by National Tube Company, McKeesport, Pa., started up last week, the men returning to work as individuals. No scale will be signed for this plant, but Amalgamated wage rate will be paid. With the resumption of operations at this works all of the manufacturing plants in the McKeesport district are in operation.

Owing to the death of John E. Sylvester, and as the most expedient means of continuing the business for the benefit of the heirs, the Sylvester Company, a Massachusetts corporation, have been formed for the purpose of continuing the business of Sylvester & Co. of 70 Kilby street, Boston. This concern were well known as dealers in new and old rails, spikes, bolts and tie rods, and controlled the Somerville Spike Works of Somerville, Mass., and the Danvers Iron Works of Danversport, Mass. All the assets of Sylvester & Co., including the works at Danversport and Somerville, have been turned in to the new corporation, and it is the intention to carry on the business with as little change as possible from the policy which has been followed in the past. The new company have a capital of \$50,000. The officers are B. F. Sylvester, president; John P. Sylvester, treasurer, and with Norman W. Bingham, Jr., are also directors.

The Humbert Works of the American Tin Plate Company, at Connellsville, Pa., a six-mill plant, will be started this week. The Amalgamated scale will be signed for this mill.

The Means & Fulton Iron Works, Birmingham, Ala., have contracted to do the following work for the Pioneer Mining & Mfg. Company at their plant at Thomas, Ala.: The building of stock house, with ore and limestone bins, overhead girders carrying tracks, bin linings with chutes and machinery for operating them. The overhead girders will be of 20-inch, 75-pound beams, carrying 70-pound rails. There will be three tracks in the stock house and four over the limestone bins. The cars on these tracks will discharge into the bins. For No. 3 furnace there will be 21 double and 19 single bins, lined with steel plates. These bins will be controlled by 244 chutes, which will be operated from a gallery running alongside the rows of bins. The stock house will be 640 feet in length and 91 feet wide. The bins will be a continuation of the stock house, extending 368 feet, and of the same width as the stock house. The overhead tracks are designed to carry steel cars of 100,000 pounds capacity each. In addition to this, they are building for the same company downcomers and platforms for their No. 3 furnace, and also making new cold blast main and gas mains for their No. 1 furnace. They are also raising and repairing the stack of the Vanderbilt Furnace, property of the Detweller Company, and are putting in new stove bottoms and rebuilding draft stack for furnace owned by the Sloss-Sheffield Company at North Birmingham. They are also making repairs to their downcomers at their city furnaces. For the Alabama Consolidated Coal & Iron Company they are rebuilding downcomers and bosh jackets at their No. 1 and 2 furnaces, Ironton, Ala.

The Standard Steel Works of Philadelphia are having plans prepared for the erection of a new open hearth steel furnace at their plant at Burnham, Pa., with a capacity of 135 tons per day.

The Shelby, Ohio, plant of the Shelby Steel Tube Company is to be greatly enlarged. Six acres of land have just been purchased and two large buildings in addition to those now under way are being planned for. It is stated that all of the small sized tubing produced by the company will be made there in the future.

The furnace at Big Stone Gap, Va., which was closed down for repairs, is expected to blow in the current week.

The Goodrich Furnace, at Goodrich, Tenn., has been closed down for retinning.

The Brier Hill Iron & Coal Company, Youngstown, Ohio, blew out their Grace Furnace September 27.

The Mattie Furnace of the Girard Iron Company, Girard, Ohio, was blown in on September 28.

The Sheridan Furnace, Sheridan, Pa., was blown out September 5.

The Ashland Coal & Iron Company, Ashland, Ky., blew in their No. 3 Furnace September 16.

The Tioga Steel & Forge Works, Seventeenth and Clearfield streets, Philadelphia, Pa., who contracted some time ago with William R. Dougherty for the erection of a new plant at Fifty-second street and Eastwick avenue, the erection of which has

been in abeyance, are now proceeding with the work under the supervision of Hales & Ballinger, architects and engineers. The buildings under construction are a work shop, 80 x 224 feet; boiler house, 40 x 48 feet; machine shop, 60 x 96 feet, and a one-story office building. A large amount of steel work is already on the ground.

The Reading Iron Company, Reading, Pa., have increased the wages of their puddlers from \$4 to \$4.25 per ton.

The American Iron & Steel Mfg. Company, Lebanon, Pa., have granted their puddlers an increase in wages from \$3.75 to \$4 per ton.

The Central Iron & Coal Company, Tuscaloosa, Ala., an allied interest of the Central Foundry Company of 116 Nassau street, New York City, were incorporated in March with a capital of \$750,000. They have acquired large tracts of red and brown ore lands and 4000 acres of coal lands about 20 miles from Tuscaloosa, where work has already been started upon a large modern blast furnace and coke ovens. As soon as these are completed a well equipped foundry will be erected in close proximity to the furnace. A considerable amount of development has already been done on the ore fields, and operations are so far advanced that by the time of the completion of the railroad, which is now in course of construction, to the furnace, 2000 tons of ore per day can be shipped. The Central Foundry Company advise us that it is not their intention to enter the field of competition on pig iron, but simply to produce their own raw material. The officers and directors are: Joseph Lodge, president; George F. Ross, vice-president; Winthrop L. Rogers, secretary and treasurer; John Reid, Chas. Smithers, Chas. B. Alexander and Herbert Taylor.

The National Rolling Mill Company, Hartford City, Ind., manufacturers of steel and iron bars, started the muck mill of their new plant October 7. The start was a successful one in every particular. By the middle of next week the company expect to reach the limit in output. The 10-inch mill is expected to be in operation by the middle of this month. The company advise us that they have enough business on their books to keep their works running full some time, and that they have 8000 or 10,000 tons of scrap in the yard.

The bar mills of the Susquehanna Iron & Steel Company, at Columbia, Pa., are running full double turn with a capacity of 3000 tons per month, exclusive of the skelp mills, which are also running full time, double turn.

The Diamond Steel plant at Reading, Pa., has been sold by Garrett B. Stevens to Frederick Greiner, 406 Drexel Building, Philadelphia, who is organizing a company under the title of the Exeter Iron Company, to operate the plant as a rolling mill for the manufacture of skelp, socket and bar iron. The mill is equipped with three trains of rolls and the necessary furnaces and machinery, and has an annual capacity of from 15,000 to 20,000 tons of finished product. John Schwanger of the Chester Tube Works will be superintendent.

In September the Edgar Thomson Steel Works of the Carnegie Steel Company, at Bessemer, Pa., made a very large output of rails. The plant worked 50 turns of 12 hours each, and the converting mill turned out 74,400 tons of ingots. In the blooming mill the output was 65,315 tons, while the total production of finished rails was 59,810 tons. This, however, is not the largest month's output at this plant, as in April last the Edgar Thomson Works turned out 62,000 tons of finished rails.

Some extensive improvements are being made at the plant of the Firth-Sterling Steel Company, at Demmier, near Pittsburgh, by which the capacity of the works will be very much increased. J. E. Porter is superintendent of this plant.

The Demmier Works of the American Tin Plate Company, at Demmier, are to be increased from 11 to 24 mills.

The Morton Works, at Cambridge, Ohio, and the Banfield Works, at Irondale, Ohio, of the American Tin Plate Company, have been put in operation, the men returning to work as individuals. The Amalgamated scale will not be signed for these two plants.

On Monday, October 6, active work was commenced on the new Crucible Steel plant, to be built by William Jessop & Sons, Limited, at Washington, Pa. At the same time work was started on the new tin mill to be built by W. H. Griffith at the same place.

The report that the Youngstown Iron, Sheet & Tube Company of Youngstown, Ohio, had engaged S. V. Huber & Co., mechanical engineers, of Pittsburgh, to draw plans for their open hearth plant is incorrect. While it is true that the Youngstown Iron, Sheet & Tube Company have decided to build a basic open hearth steel plant, to supply steel for their sheet and tube mills, work on this plant will not be started for some time. However, we can state that the concern will build two skelp mills, and S. V. Huber & Co. have made plans for these. One will be built immediately, and the other in the near future.

We can state on official authority that the report that the American Bridge Company would build a very large addition to the Walker Works, at West Homestead, Pa., is incorrect. No enlargements to this plant at the present time are contemplated.

#### General Machinery.

The Cincinnati Mattress & Feather Company, Second and Syracuse streets, Cincinnati, write us to the effect that they are about to purchase an equipment of carding machines, such as are used for making felt bats for felt mattresses, and also feather renovators. Heretofore the company have purchased their felt batting, which they now propose manufacturing themselves.

Lamar Watson, First National Bank Building, Greenville, Miss., writes that he is in the market for an equipment of saw mill machinery, and wishes addresses of concerns who build machinery for such purposes.

The Philadelphia Machine Screw Company, 624-626 Race street, Philadelphia, Pa., have materially increased their facilities for the manufacture of machine screws of various kinds, particularly those of a special nature, studs, pins and nuts, and all articles turned from iron or brass wire, and are prepared to make good deliveries on the above class of goods.

Wilmarth & Morman of Grand Rapids, Mich., builders of the Yankee drill grinder, report orders for four grinders from the United States Government, and for an equal number from the Allis-Chalmers Company.

The Eynon-Evans Mfg. Company, Philadelphia, Pa., report increased orders in steam jet condensers, and are now working on a large acid resisting bronze condenser for the Lehigh Valley Coal Company, at Hazelton, Pa.; also two machines for the New England Engineering Company, one of which is to be installed at Norwich, Conn. They have just completed a plant for the Electric Light Works at Salisbury, Md., and say further that they have prospects of other large orders for this branch of their business.

J. F. Stuckert & Son, architects, Philadelphia, Pa., are receiving bids for the power plant, 75 x 100 feet, and forming mill, 75 x 150 feet, to be built at Roelofs, Bucks County, Pa., for Henry H. Roelofs.

The General Electric Company, at Schenectady, N. Y., have broken ground for a new machine shop, 503 x 100 feet. The contract for the steel structure has been given to the American Bridge Company. The equipment, including a large number of machine tools, has been purchased.

The George D. Hayden Machine Company lost about \$8000 in the fire which destroyed nearly a whole block in Alton, Ill., last week.

Baugher, Kurtz & Co., founders and machinists, of York, Pa., have on hand large orders for powder mill machinery. They have just shipped a corning mill of an improved type of the Krupp design to the Cambria Powder Company of Johnstown, Pa. They have also under construction for the same company another corning mill of the same design, two glaze barrels, two 18-ton chasers, and, in fact, an entire equipment for the manufacture of powder.

The Soulé Steam Feed Works, manufacturers of saw mill specialties, of Meridian, Miss., have just shipped four lumber stackers to the Alger, Sullivan Lumber Company of Century, Fla.; one lumber stacker to the Camp & Hinton Lumber Company, Lumberton, Miss.; one lumber stacker to the East Coast Lumber Company, Watertown, Fla., and one to the Vale-Royal Mfg. Company, Savannah, Ga. They are also about to ship four lumber stackers to the Louisiana & Texas Lumber Company of South East, Texas. Of log loaders they have recently shipped one to the Hand Lumber Company, Dolve, Ala.; one to the Yellow Pine Lumber Company, Yellow Pine, Ala.; one to the E. E. Jackson Company, Ridgerville, Ala.; one to the May-Easterling Lumber Company, Ora, Miss. They have an order in hand for one log loader for the Tallahatta Lumber Company, Chunky, Miss. Of timber unloaders shipped recently one went to the Empire Planing Mill Company, Jackson, Miss., and one to the Union Lumber & Planing Mill Company, Hattiesburg, Miss. Recent steam feed shipments are as follows: One to R. W. H. & J. W. Brooks, Merrillville, Ga.; one to the Muskegon Lumber Company, Lake, Miss.; one to L. C. Gracy, High Springs, Fla.; one to E. Abernathy, Sampson, Fla., and one to the Bradley Timber Company, Citronelle, Ala. They have also an order in hand for one for the Ferris Lumber Company, Leo, Wyom.

The blacksmith shop of the American Car & Foundry Company's plant, at Terre Haute, Ind., was last week destroyed by fire. The loss on the building and machinery is estimated to be about \$15,000.

The Hendey Machine Company, manufacturers of machine tools, of Torrington, Conn., are erecting a two-story storehouse, 40 x 60 feet, of brick with iron roof, that will be used for the keeping of patterns, &c.

#### Foundries.

Thomas Furrow & Sons, Philadelphia, Pa., are about to make additions to their brass foundry and machine shop. The capacity of the present plant will be doubled.

The Marysville Foundry Company, Marysville, Ohio, have started up their new foundry with ample facilities for the manufacture of all kinds of castings. The concern will make a specialty of land rollers and farm trucks.

The Franklin Steel Casting Company, Franklin, Pa., manufacturers of high grade steel castings, will extend their entire

plant 160 feet, and will put in an additional 20-ton furnace. The construction is under the supervision of S. Diescher & Sons, engineers, Pittsburgh, Pa.

The Eaton, Cole & Burnham Company of Bridgeport, Conn., manufacturers of brass and iron goods for steam, water and gas, have purchased on South avenue extension a large tract of land with dock property, and will erect at once a steel and brick foundry building 400 feet long and 150 feet wide, together with power plant and buildings for tumbling barrels, cores, pattern storage, tapping department, sorting, storage, shipping, &c. Contracts for the entire work have been let to the Berlin Construction Company of Berlin, Conn., and 220 Broadway, New York.

The Wellman-Seaver Engineering Company of Cleveland are preparing plans for the plant of the Acme Foundry Company, which will be erected in that city. The company have purchased a site, 450 x 200 feet, and will erect a foundry costing about \$75,000. Their present plant will be abandoned.

#### Engines and Boilers.

Lamar Watson, First National Bank Building, Greenville, Miss., wishes to know the address of the concern building "Skinner & Wood" engines and boilers. He also desires the addresses of other engine and boiler builders, as he is about to purchase an equipment for a saw mill.

The Ames Iron Works, manufacturers of engines and boilers, Oswego, N. Y., advise us that they have not as yet definitely decided to make the reported enlargement of their plant. It is probable, however, that the contemplated addition to the boiler shop will be built, which will, with the extension, be 300 x 100 feet.

The Murray Iron Works Company, Burlington, Iowa, are about completing the new boiler shop that they have been adding to their works. It is of steel construction, giving a lofty room and ample crane facilities for handling heavy work. Adjacent to the boiler shop a brick and steel flanging shop is being erected, which will be an auxiliary to that department. The company are also putting in foundations for a steel frame addition to the Corliss engine shops.

The Birmingham Boiler Works, Birmingham, Ala., have contracted to build five boilers 16 feet long and 6 feet in diameter for the Birmingham Electric Light Plant Company, which order makes 33 boilers supplied to the same company within three years. They have also sold a gas producer plant for the Alabama Tube & Iron Company, Helena, Ala. They are making 21 oil tanks for the new oil producing district in Texas, the costs of which will aggregate about \$30,000. The company have also just erected a tank 42 feet in diameter, 25 feet high, for the National Tank & Export Company, Savannah, Ga., for the storage of turpentine.

The Hardie-Tynes Foundry & Machine Company, Birmingham, Ala., are now occupying their new works at Eighth avenue and Twenty-eighth street. Although capacity has been increased three times over the old works yet the whole force is kept working overtime. They have orders for a considerable number of Corliss engines, among which are the following: Two 200 horse-power for the Barnett & Record Company, Minneapolis, Minn.; one 500 horse-power for the Gonzales Cotton Mill Company, Gonzales, Texas; one 150 horse-power for the New York Metallic Bedstead Company, Jersey City, N. J.; two 250 horse-power for the National Dredging Company, Wilmington, Del.; one 300 horse-power for the McNally Mfg. Oil Company, Norfolk, Va., and two 225 horse-power for the High Point Machine Company, High Point, N. C.

#### Hardware.

The Marlin Fire Arms Company, New Haven, Conn., have well under way a new four-story brick addition about 115 feet long and about 50 feet wide. It is expected that it will be completed and ready for occupancy early in 1902. About 20,000 square feet of floor surface will thus be added to their plant. This will enable them to add to their output next season, and serve their customers more promptly than ever before.

Michigan Wheelbarrow & Truck Company, Saginaw, Mich., have lately increased their capital stock from \$25,000 to \$50,000. They are pushing the truck and mining car trade, and for this reason require more capital. The company have lately started to manufacture coal cars quite extensively, and advise us that they are making a complete line.

The large five-story building which the Penn Hardware Company, Reading, Pa., have in course of erection is nearing completion. But two more stories remain to be completed, and it is expected that the structure will be finished and ready for occupation in six weeks. The building will be used for manufacturing and for storage and packing purposes. It is 166 feet long and 60 feet wide, and the walls are 27 inches thick. Employment will be given to 100 more hands.

The Austin-Bryan Mfg. Company, Birmingham, Ala., have just finished and put in operation a complete power plant, embracing high pressure boilers, Corliss heavy duty engine and an electric light and power plant which will drive the different departments in their now completed plow factory. They state that they are using in their factories only open hearth steel produced within a few hundred yards of their plant at

Ensley. This steel is made under special chemical analyses, which insures its being of superior quality for the manufacture of plows. They are producing this season a complete line of wood and steel plows adapted to the requirements of the trade. Their recent heavy addition of new machinery has increased their daily capacity very considerably, and enables them to fill all orders promptly and satisfactorily.

American Lawn Mower Company, Richmond, Ind., have outgrown their facilities in that city, and have lately purchased a large plant in Muncie, which they are now preparing for their occupancy. The company expect to be in operation there in the course of about 30 days, with much better facilities than heretofore.

#### Miscellaneous.

The large plant at Shelby, Ohio, until recently operated by the American Bicycle Company, has been sold to a company composed of Shelby and New York people, and it is stated that it is their intention to manufacture locomotives. Among those interested in the new company are A. W. Gump, formerly at the head of the Shelby Cycle Mfg. Company, who owned the plant previous to its consolidation; Col. A. A. Pope, formerly at the head of the Pope Mfg. Company; B. J. Williams, a Shelby banker, and Hon. W. W. Skiles of Shelby. Much of the equipment of the bicycle plant has been purchased for the new company. It is stated they will employ 500 men.

The Birmingham Iron & Supply Company, Birmingham, Ala., have purchased the business of the Jefferson Iron Company, and have now made the plant of the latter on First avenue and Twenty-seventh street their headquarters. The business will be continued as heretofore, handling relay rails, mill supplies, second-hand machinery and scrap iron and metals.

The Cleveland Wire Spring Company, manufacturers of wire springs of all kinds, are preparing to erect a large addition to their plant adjoining their present establishment. Plans for the building are being prepared by Knox & Elliott, Cleveland, architects, and bids for the building and equipment are being called for.

The Birmingham Cement Company, Birmingham, Ala., whose new manufactory at Ensley was recently completed, have had a continually increasing trade. Demand is equal to the full capacity of the new works. They are shipping throughout the States of Alabama, Georgia, Mississippi and Louisiana.

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**A New Southern Iron Plant.**—Within the next three weeks the Knoxville Iron Company, Knoxville, Tenn., manufacturers of bar iron, will commence the foundations for a new iron and steel plant at Lonsdale, a suburb of Knoxville. The preliminary drawings have been prepared by the company's architect, Mr. Hammerberg, and it is expected that within three months the rolling mill, which will first be erected, will be in operation. The construction of the steel plant will not be commenced until the new mill is in complete running order. The general plan calls for three buildings, of steel frame construction with iron roof and side walls, aggregating 800 feet in length, in which will be all the rolling mill machinery. In addition there will be a number of smaller buildings, including warehouses, machine shops, tool houses, wood working shop, &c. Four side tracks will run through the plant, connecting with the belt line of the Southern Railroad.

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On Sunday, October 6, work was completed by which trains ran into the Pittsburgh Union depot on elevated tracks. A great deal of fast work was necessary to make the change, so that there would be no interruption of traffic. A new bridge is being built across the Allegheny River to carry the Ft. Wayne tracks, and it is intended to elevate the tracks through Allegheny. Thousands of tons of structural material are being used in this work, most of which is being furnished by the Homestead mills of the Carnegie Steel Company. The first floor of the Union station is nearly completed and is now being used.

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The Erie car works of Erie, Pa., builders of all kinds of freight cars, forgings and wood work, have completed an order for 100 tank cars for the J. M. Guffey Petroleum Company, at Beaumont, Texas. The concern also have orders for 40 tank cars for other parties, and in the past 11 months have turned out over 350 tank cars for private car lines and independent refineries all over the country.

## The Iron and Metal Trades.

Despite the talk in some circles that higher prices may be forced, the feeling with some of the large interests is that values are now as high as is reasonable. In fact, the belief is more and more frequently expressed that we are on the crest of the wave and that we will do well if we maintain the present level.

Some of the large interests are apparently seeking with vigor for large contracts for next year's delivery, and for such backlog orders current quotations for immediate delivery are of very little account. In Steel, for instance, materially lower prices are made for 1902. Probably any pressure to market product, should it develop toward the close of the year, would be first witnessed in an effort to stimulate the export demand. As yet there is not the slightest sign of this. It will take months to fill the gaps in stocks of those finished lines which were affected by the strike, and in other branches, notably in Structural Material, deliveries are only now beginning to show some improvement. But in other departments the evidence of slackening in the demand is becoming somewhat more emphatic. This is particularly true of Plates, in which, by the way, the Association agreement was renewed for another year. In the Wire trade the outside competition is beginning to tell. Wire Rods have been slowly receding in price and the quotations on Nails are more and more frequently shaded.

In Pig Iron further purchases of Bessemer and Basic in the Central West by the leading interest are reported, but there have been some signs of unexpected weakness in the East, under the temptation of a few really good orders.

Our monthly blast furnace statistics show a moderate increase in the capacity of the plants active on the first of this month. This is due principally to the resumption of a few stacks idle owing to the strike, and to the starting of the new blast furnace of the Sharon Steel Company. The merchant furnaces, in the aggregate, have further reduced their stocks of Pig Iron to the extent of nearly 20,000 tons. This, of course, does not take into account the stocks in the yards of the large Steel makers. On the face of it the statistical position continues exceedingly strong. Taking it altogether, we have now for months been running very close indeed for safety. It is very doubtful whether there are two weeks' stock of Pig Iron in producers' hands, which is a very narrow margin to provide against accidents or contingencies, particularly since, notoriously, consumers are carrying very little Pig Iron.

### A Comparison of Prices.

At date, one week, one month and one year previous.

#### Advances Over the Previous Month in Heavy Type. Declines in Italics.

	Oct. 9, 1901.	Oct. 2, 1901.	Sept. 11, 1901.	Oct. 8, 1900.
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<b>PIG IRON:</b>				
Foundry Pig, No. 2, Standard, Philadelphia.....	<b>\$15.00</b>	<b>\$14.90</b>	<b>\$14.75</b>	<b>\$15.00</b>
Foundry Pig, No. 2, Southern, Cincinnati.....	<b>13.75</b>	<b>13.75</b>	<b>13.00</b>	<b>13.00</b>
Foundry Pig, No. 2, Local, Chicago.....	<i>14.50</i>	<b>15.00</b>	<b>15.00</b>	<b>14.50</b>
Bessemer Pig, Pittsburgh.....	<b>15.85</b>	<b>15.75</b>	<b>15.75</b>	<b>13.00</b>
Gray Forge, Pittsburgh.....	<b>13.75</b>	<b>13.75</b>	<b>13.50</b>	<b>12.75</b>
Lake Superior Charcoal, Chicago..	<b>17.00</b>	<b>17.00</b>	<b>17.00</b>	<b>18.00</b>

#### BILLETS, RAILS, ETC.:

Steel Billets, Pittsburgh (nom)....	<b>26.50</b>	<b>26.50</b>	<b>24.50</b>	<b>16.50</b>
Steel Billets, Philadelphia (nom)...	<b>26.50</b>	<b>27.50</b>	<b>27.00</b>	<b>19.25</b>
Steel Billets, Chicago, (nom)....	<b>26.50</b>	<b>25.50</b>	<b>26.00</b>	<b>19.50</b>
Wire Rods (delivered).....	<b>34.50</b>	<b>35.50</b>	<b>36.00</b>	<b>38.00</b>
Steel Rails, Heavy, Eastern Mill..	<b>28.00</b>	<b>28.00</b>	<b>28.00</b>	<b>26.00</b>
Spikes, Tidewater.....	<b>1.80</b>	<b>1.80</b>	<b>1.80</b>	<b>1.40</b>
Splice Bars, Tidewater.....	<b>1.50</b>	<b>1.50</b>	<b>1.50</b>	<b>1.25</b>

#### OLD MATERIAL, PER GROSS TON

O. Steel Rails, Chicago.....	<b>13.50</b>	<b>13.50</b>	<b>13.00</b>	<b>10.00</b>
O. Steel Rails, Philadelphia.....	<b>17.75</b>	<b>16.75</b>	<b>16.50</b>	<b>12.50</b>
O. Iron Rails, Chicago.....	<b>21.00</b>	<b>21.00</b>	<b>20.50</b>	<b>18.50</b>
O. Iron Rails, Philadelphia.....	<b>20.00</b>	<b>19.50</b>	<b>18.50</b>	<b>15.50</b>
O. Car Wheels, Chicago.....	<b>16.00</b>	<b>16.00</b>	<b>16.00</b>	<b>16.00</b>
O. Car Wheels, Philadelphia.....	<b>16.50</b>	<b>16.50</b>	<b>16.50</b>	<b>15.50</b>
Heavy Steel Scrap, Chicago.....	<b>13.00</b>	<b>13.00</b>	<b>12.00</b>	<b>10.00</b>

#### FINISHED IRON AND STEEL, PER POUND:

Refined Iron Bars, Philadelphia...	<b>1.62½</b>	<b>1.62½</b>	<b>1.62½</b>	<b>1.25</b>
Common Iron Bars, Chicago.....	<b>1.70</b>	<b>1.65</b>	<b>1.60</b>	<b>1.35</b>
Common Iron Bars, Youngstown.....	<b>1.50</b>	<b>1.50</b>	<b>1.50</b>	<b>1.25</b>
Steel Bars, Tidewater.....	<b>1.65</b>	<b>1.65</b>	<b>1.60</b>	<b>1.20</b>
Steel Bars, Pittsburgh.....	<b>1.50</b>	<b>1.50</b>	<b>1.50</b>	<b>1.05</b>
Tank Plates, Tidewater.....	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.20</b>
Tank Plates, Pittsburgh.....	<b>1.80</b>	<b>1.80</b>	<b>1.80</b>	<b>1.05</b>
Beams, Tidewater.....	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.25</b>
Beams, Pittsburgh.....	<b>1.60</b>	<b>1.60</b>	<b>1.60</b>	<b>1.50</b>
Angles, Tidewater.....	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.55</b>
Angles, Pittsburgh.....	<b>1.80</b>	<b>1.80</b>	<b>1.80</b>	<b>1.40</b>
Skelp, Grooved Iron, Pittsburgh..	<b>2.00</b>	<b>2.00</b>	<b>2.00</b>	<b>1.40</b>
Skelp, Sheared Iron, Pittsburgh..	<b>2.00</b>	<b>2.05</b>	<b>2.05</b>	<b>1.47½</b>
Sheets, No. 27, Pittsburgh.....	<b>3.15</b>	<b>3.27</b>	<b>3.75</b>	<b>2.80</b>
Barb Wire, f.o.b. Pittsburgh.....	<b>2.00</b>	<b>2.00</b>	<b>2.00</b>	<b>2.80</b>
Wire Nails, f.o.b. Pittsburgh.....	<b>2.25</b>	<b>2.30</b>	<b>2.30</b>	<b>2.30</b>
Cut Nails, Pittsburgh.....	<b>2.00</b>	<b>2.05</b>	<b>2.05</b>	<b>1.95</b>

#### METALS:

Copper, New York.....	<b>16.50</b>	<b>16.50</b>	<b>16.50</b>	<b>16.67</b>
Spelter, St. Louis.....	<b>4.05</b>	<b>3.95</b>	<b>3.87½</b>	<b>4.00</b>
Lead, New York.....	<b>4.87½</b>	<b>4.87½</b>	<b>4.87½</b>	<b>4.87½</b>
Lead, St. Louis.....	<b>4.35</b>	<b>4.35</b>	<b>4.25</b>	<b>4.83½</b>
Tin, New York .....	<b>24.40</b>	<b>24.25</b>	<b>25.75</b>	<b>29.65</b>
Antimony, Hallett, New York....	<b>8.50</b>	<b>8.50</b>	<b>8.50</b>	<b>9.50</b>
Nickel, New York.....	<b>60.00</b>	<b>60.00</b>	<b>60.00</b>	<b>55.00</b>
Tin Plate, Domestic Bessemer, 100 lbs., New York.....	<b>4.19</b>	<b>4.19</b>	nom.	<b>4.19</b>

### Chicago.

FISHER BUILDING, October 9, 1901.—(By Telegraph.)

The local Iron trade maintains its condition of great activity. Much additional business has taken place in Pig Iron, Bar Iron, Structural Material, Rails and other classes of railroad material. The demand has been so strong that prices have in some instances again been advanced and in others a strong tendency to higher figures is apparent. The market is getting in such condition that even the most conservative manufacturers feel that the pressure to advance is becoming too strong for them to resist it.

**Pig Iron.**—The strong buying movement which set in about two weeks since is running at full tide. Large consumers are freely purchasing for delivery running far into next year, contracts having been made the past week for numerous quantities running from 1000 tons upward. Some of the very large inquiries did not develop into as much actual business as had been expected. The buyers were inclined to believe that by waiting a little longer they might get better terms. This business is thus merely deferred and the full amount will ultimately be bought. This is the season when jobbing foundrymen are making contracts with their customers for the winter or for the first six months of next year, and they are covering their contracts by purchases of Iron.

Very good sales of Charcoal Iron have been made in the Northwest. Northern and Southern prices of Foundry Iron are now more nearly on an equity. We quote as follows:

Lake Superior Charcoal.....	\$17.00 to \$18.00
Local Coke Foundry, No. 1.....	15.00 to 16.00
Local Coke Foundry, No. 2.....	14.50 to 15.00
Local Coke Foundry, No. 3.....	14.00 to 14.50
Local Scotch, No. 1.....	15.25 to 16.00
Ohio Strong Softeners, No. 1.....	16.00 to 16.50
Southern Silvery, according to Silicon.....	15.40 to 15.65
Southern Coke, No. 1.....	15.15 to 15.40
Southern Coke, No. 2.....	14.40 to 14.65
Southern Coke, No. 3.....	13.90 to 14.15
Southern Coke, No. 1 Soft.....	15.15 to 15.40
Southern Coke, No. 2 Soft.....	14.40 to 14.65
Foundry Forge.....	13.40 to 13.65
Southern Gray Forge.....	13.15 to 13.40
Southern Mottled.....	13.15 to 13.40
Southern Charcoal Softeners, according to Silicon.....	15.50 to 16.50
Tennessee Silicon Pig.....	16.40 to 16.65
Alabama and Georgia Car Wheel.....	19.50 to 20.50
Malleable Bessemer.....	15.75 to 16.00
Standard Bessemer.....	17.25 to 17.50
Jackson County and Kentucky Silvery, 8 per cent. Silicon.....	15.75 to 16.25

**Bars.**—A meeting of Bar Iron manufacturers was held here last week and the reports made by those present were of such a character that they felt justified in advancing the price of mill shipments of Common Iron to 1.70c., Chicago, which is an advance of \$1 per ton. The price of Soft Steel Bars continues at 1.65c. A good run of business is reported, with many consumers now asking prices, or desiring to be let in at the old figure, who were indifferent only two or three weeks since, asserting that they were well covered. Light Hoops are extremely scarce, the largest makers being three to four months behind on deliveries. Jobbers are still enjoying a heavy demand for quick shipments from stock. The large number of heavy consumers now drawing from jobbers' stock indicates the difficulty in receiving shipments from mills in sufficient quantity to keep them supplied. Small lots are sold at 2c. for Common Bar Iron and 1.90c. to 2c. for Steel Bars.

**Car Material.**—Business in this line has increased heavily. Large orders are being placed for Axles, Channels, Plates, Bars, and all other material entering into the construction of cars.

**Structural Material.**—Several thousand tons of Structural Shapes have been sold to car builders. Other consumers are purchasing freely. An excellent demand is coming from the independent bridge builders. Prices are unchanged, but the impression is growing that the manufacturers will shortly be compelled to advance quotations on account of the very heavy volume of business. Mill shipments are quoted as follows: Beams, Channels and Zees, 15 inches and under, 1.75c.; 18 inches and over, 1.85c.; Angles, 1.75c. rates; Tees, 1.80c.; Universal Plates, 1.75c. to 1.85c.; small lots of Beams and Channels from local yards are quoted at 2.25c.; Angles, 2c. rates; Tees, 2.15c.

**Plates.**—Some orders are being placed for mill shipment, but so far as can be learned the volume of business is not particularly heavy at present. Some of the mills are able to make deliveries in three or four weeks, but others cannot promise shipments under six to eight weeks, so that the condition of this trade is fairly satisfactory. The demand for small lots from store is good. Mill shipments are quoted as follows: Tank Plate,  $\frac{1}{4}$ -inch and heavier, 1.75c. to 1.80c., Chicago; Flange, 1.85c.; Marine, 1.95c. Jobbers are selling small lots from store at 1.90c. to 2c. for Tank, and 2.25c. for Flange, with the usual extras for heads, segments, lighter gauges, &c.

**Sheets.**—Quite a heavy demand is felt by manufacturers and some orders are being taken by independent mills, but these are not now in a position to promise even reasonably early shipments. Jobbers are having a continued pressure for shipment from local stocks, especially on Black Sheets. The mills recently on strike are making a little better delivery, but the supply of Black Sheets is still far below the requirements of the trade, and it is necessary to pay a premium for such sizes as may be found in stock. The supply of Galvanized Sheets is somewhat better than that of Black Sheets, but assortments are still madly broken. Prices

are continued at 4c. to 4.10c. for No. 27 Black Sheets, but 65 off is the ruling rate for Galvanized.

**Merchant Pipe.**—The market is not yet in such condition that definite quotations can be made. The prices prevailing are still arbitrary, depending on the condition of local stocks and on the sizes desired. The volume of business, however, is increasing and good inquiries are coming forward for mill shipment. Buyers are endeavoring to place these mill orders at ante-strike price, but this will not be accepted by independent manufacturers.

**Boiler Tubes.**—Jobbers find a fair demand from stock, which is quite strong on some sizes on which the mills are not yet making satisfactory deliveries. Quotations are as follows:

	Steel.	Iron.
2 $\frac{1}{2}$ to 5 inches.....	57 $\frac{1}{2}$	47 $\frac{1}{2}$
1 $\frac{1}{2}$ to 2 $\frac{1}{2}$ inches.....	50	40
1 to 1 $\frac{1}{2}$ inches.....	35	30
6 inches and larger.....	52 $\frac{1}{2}$	45

**Steel Billets.**—The demand is greater than the supply. A large inquiry which has been in the market for some time is reported to be still seeking a Steel manufacturer in position to accept it. An interesting item in this connection is the reported intention of the Grand Crossing Tack Company to put up an Open Hearth Steel plant to make their own Billets.

**Rails and Track Supplies.**—Railroad companies are placing more orders for Rails for next year's delivery, and a very good demand is coming from new lines of electric railroad. The demand from electric lines is growing to be quite a feature of the Rail trade. The demand for Track Fastenings continues heavy. Rails are unchanged at \$28 for Heavy Sections and \$30 for 45-lb. Rails. Track Fastenings are firmly held as follows: Splice Bars, 1.65c. to 1.75c.; Spikes, 2.10c.; Track Bolts, with Hexagon Nuts, 2.90c. to 2.95c.; Square Nuts, 2.75c. to 2.80c.

**Merchant Steel.**—The general trade is in good condition, a constant run of orders being received by manufacturers. Cold Rolled Shafting appears to be a little firmer, with competition among manufacturers not quite so keen. Mill shipments, Chicago, are quoted as follows: Smooth Finished Machinery Steel, 2c. to 2.10c.; Smooth Finished Tire, 1.85c. to 2c.; Open Hearth Spring Steel, 2.30c. to 2.40c.; Toe Calk, 2.40c. to 2.60c.; Sleigh Shoe, 1.85c. to 1.90c.; Cutter Shoe, 2.40c. to 2.60c.; Cold Rolled Shafting, 55 off. Ordinary grades of Crucible Tool Steel are quoted at 6 $\frac{1}{4}$ c. for carloads and 7c. to 7 $\frac{1}{2}$ c. from store; Specials, 12c. upward.

**Old Material.**—The market is peculiar. Dealers are paying high prices for everything they purchase, but find consumers not disposed to meet their views. Some business is doing in Busheling Scrap, Borings and Turnings, and a better demand is noted for Old Steel Rails for rerolling. The supply of Relaying Rails is almost exhausted and prices are only nominal. Higher rates would perhaps be paid if buyers could secure the sections they desire. The following are approximate quotations per gross ton:

Old Iron Rails.....	\$21.00 to \$21.50
Old Steel Rails, mixed lengths.....	13.50 to 14.00
Old Steel Rails, long lengths.....	18.00 to 18.50
Heavy Relaying Rails.....	25.50 to 26.00
Old Car Wheels.....	16.00 to 16.50
Heavy Melting Steel Scrap.....	13.00 to 13.50
Mixed Steel.....	10.50 to 11.00

The following quotations are per net ton:

Iron Fish Plates.....	\$18.00 to \$18.50
Iron Car Axles.....	21.00 to 21.50
Steel Car Axles.....	16.00 to 16.50
No. 1 Railroad Wrought.....	16.00 to 17.00
No. 2 Railroad Wrought.....	14.00 to 14.50
Shafting.....	16.50 to 17.00
No. 1 Dealers' Forge.....	13.00 to 13.50
No. 1 Busheling and Wrought Pipe.....	12.25 to 12.75
Iron Axle Turnings.....	11.25 to 11.75
Soft Steel Axle Turnings.....	11.00 to 11.25
Machining Shop Turnings.....	11.00 to 11.25
Cast Borings.....	5.00 to 5.25
Mixed Borings, &c.....	5.25 to 5.50
No. 1 Boilers, cut.....	11.50 to 12.00
No. 2 Boilers, cut.....	9.50 to 10.00
Heavy Cast Scrap.....	11.25 to 11.75
Stove Plate and Light Cast Scrap.....	8.50 to 9.00
Railroad Malleable.....	12.00 to 12.50
Agricultural Malleable.....	11.00 to 11.50

**Metals.**—Pig Lead is firmly held, but Copper is said to be slightly easier, although no actual change has occurred in quotations. Carload lots of Lake Copper

are maintained at 17c. and Casting brands at 16½c. Pig Lead is unchanged at 4.32½c. for Desilverized and 4.42½c. for Corroding in 50-ton lots. Dealers continue to quote selling prices on small lots of Old Metals as follows: Copper Wire and Heavy, 15c. to 15½c.; Copper Bottoms, 14c.; Pipe Lead, 4.15c.; Zinc, 2.75c.

**Coke.**—Local consumers are still finding great difficulty in securing enough Coke to supply their wants. The shortage of cars has not been relieved, and the most urgent appeals are fruitless in relieving the situation. Prices are unchanged on contracts for future delivery, but high prices would be paid for spot Coke.

H. R. Durkee, Pig Iron commission merchant, has removed his office from 115 Dearborn street to room 805 Rookery Building, Chicago. Mr. Durkee represents a number of prominent brands of Northern and Southern Pig Iron.

## Philadelphia.

FORREST BUILDING, October 8, 1901.

It may not be strictly orthodox to refuse credence in regard to the extremely soaring conditions which are said to prevail in the Iron and Steel trades. Business is certainly in very good condition, but it can be that without an everlasting stream of adjectives to persuade people that there never was such prosperity as prevails to-day. It is safer and better to define the situation as it actually is, rather than as people would like it to be. With this object in view we may remark that business is not at all booming; it is good, very good, much better, in fact, than might have been expected, considering the adverse influences which have been developed during the past three months. The interests of the trade, however, are more in the three months which will close the record for 1901, rather than in those which have already been closed. The business horizon is scanned with almost as much anxiety as the tempest tossed mariner looks for the well-known lights and signals when approaching a dangerous coast. Candid minds must recognize the uncertainties which loom up in the distance. There may not, and probably will not be, any material change this year, and it is just possible that the favorable conditions which the trade now enjoys may be carried well into next year, but the indications, if carefully considered, do not encourage such expectations. It is not necessary to reiterate what has been said in several recent reports (although they need no modification), but a square look at conditions as they exist to-day shows that Pig Iron for long delivery is not taken with the degree of avidity which usually characterizes a strong market. Steel is scarce and strong for October delivery, but for next year it has been intimated to large buyers that bids at a couple of dollars (or thereabouts) less than October prices would receive favorable consideration. The Plate mills are gunning for orders very sharply, and while the "gentlemen's agreement" prevents cutting in prices, it is clear that work is not coming out as it has been all the year up to a very recent date. Other departments are in better shape owing to the shortage made during the strike, but they are catching up a little, not enough to affect prices, but deliveries are somewhat easier. For the market in detail we report as follows:

**Pig Iron**—Is about as firm and as steady as any article on the list. Stocks have been at a low point for months past, and there is reason to believe that they will show a further decrease when the next monthly statement is issued. There is not an actual famine, but there is so little Iron on hand that the week's deliveries have to be largely drawn from the week's production, consequently the market for all of 1901 is likely to be well under control of the selling interests. Sales are moderately large, but they are nearly all for this year's deliveries, beyond that the demand is hesitating. For 1901 prices are strong, probably a shade higher, but so far buyers have not been induced to engage much Iron for next year. There is a disposition to indulge in very strong talk about the probability of a continued scarcity

for a long time to come, and it was recently claimed that certain grades of Iron were absolutely unobtainable. There have been some quite large inquiries for this identical grade of Iron during the past few days, and it was surprising how many sellers were running after the orders, and the most curious feature was that many, if not all, the bidders were willing to shade the prices at which it has been said that the market was entirely cleaned up. These transactions have not yet been fully closed, hence it would be unfair to give particulars until the trades are completed. Mill Irons are quiet and not as firm as they were some time ago, but there is no quotable change in prices. Foundry grades are the strongest article on the list and prices average a shade higher than last week. Competition is rather close on Basic Iron, and \$13.25 to \$13.50 at furnace would be outside figures. The general market may be quoted about as follows for city and nearby deliveries and from 25c. to 50c. less at points within a radius of 100 miles south or west: No. 1 X Foundry, \$15.50 to \$16; No. 2 X Foundry, \$15 to \$15.50; No. 2 Plain, \$14.75 to \$14.90; Standard Gray Forge, \$13.75 to \$14; Ordinary Gray Forge, \$13.25 to \$13.50; Basic (Chilled), \$14 to \$14.25; Bessemer, Nominal, at about \$14.50.

**Billets.**—The market is very unsettled, and it is impossible to give strictly accurate quotations—quantity, point and dates for delivery have to be taken into account—but anywhere from \$26.50 to \$27.50 would be reasonably near the market for October and November shipments; but for the first half of 1902 very much better could be done, but consumers are not inclined to bid for large lots at present.

**Muck Bars.**—Prices are a trifle easier, but good neutral Bars would sell at about \$28, f.o.b. seller's mill.

**Plates.**—There is unquestionably a considerable falling off in the demand, and manufacturers are looking for new business somewhat anxiously. Prices will probably be maintained on account of the agreement which was entered into by all the leading concerns early in the year, but the change in the outlook is not encouraging. Prices are about as follows for city and nearby deliveries: Plates, ¼-inch and thicker, 1.70c. to 1.75c.; Universals, 1.60c. to 1.70c.; Flange, 1.90c. to 2.10c.

**Structural Material.**—The scarcity of Shapes for anything like prompt delivery is in no degree abated, and buyers have to pay according to what they want, and when they want it. Nominally prices are unchanged, as follows, for seaboard or nearby deliveries: Angles, 1.75c. to 1.85c.; Beams and Channels, 15-inch and upward, 1.75c. to 1.85c.

**Bars.**—There is a continued good demand, and with the higher cost for production it is understood that a small general advance will be made at an early date. Skelp is in great demand at \$1.90 to \$2, f.o.b. cars sellers' mills, consequently Bars are relatively too low at present prices, which for carloads as a minimum quantity are about as follows for Philadelphia and nearby points: Best Refined Iron, 1.60c. to 1.65c.; Steel, 1.62½c. to 1.67½c.

**Sheets.**—There is plenty of demand, and mills are still unable to catch up with the demand, although there is a slight easing up both in price and in deliveries. Philadelphia prices are about as follows for best Sheets (Common Sheets two-tenths less): No 10, 2.50c.; No. 14, 2.70c.; No. 16, 2.80c. to 2.90c.; Nos. 18-20, 3.40c.; Nos. 21-24, 3.50c.; Nos. 26, 27, 3.65c. to 3.70c.; No. 28, 3.80c. to 4c.

**Old Material.**—The market is strong and something approaching "a boom" is reported in some directions. Holders are very firm, and are not looking at the inside quotations unless for reasons apart from the general market. Bids and offers for deliveries in buyers' yards are as follows: Choice Railroad Scrap, \$19.75 to \$20.50; Country Scrap, \$15.60 to \$17; No. 2 Light (Ordinary), \$12.50 to \$13; No. 2 Light (Forge), \$13.75 to \$14.25; Machinery Cast, \$13.75 to \$14.25; Heavy Steel, \$17.75 to \$18.25; Old Steel Rails, \$17.75 to \$18; Old Iron Rails, \$20 to \$20.50; Wrought Turnings, \$11.75 to \$12.50; Cast Borings, \$7.25 to \$7.75; Old Car Wheels, \$16.50 to \$17; Iron Axles, \$23.50 to \$24; Steel Axles, \$19 to \$20.

## Cleveland.

CLEVELAND, OHIO, October 8, 1901.

**Iron Ore.**—The movement of Ore down the lakes during the month of September was 2,893,669 tons, an increase over the same month a year ago of 374,626 tons. The aggregate movement to October 1 was 15,157,105 tons, from the opening of the season of navigation. This shows an increase of 272,040 tons over the same period a year ago. The shippers therefore have regained the ground they lost at the opening of the season of navigation and are able to devote their time from now to the end of the season in increasing the total output for the year. It is to be a question whether they will be able to accomplish much in this way. It seems impossible to maintain the speed of shipment which was noticed during August and the first part of September, because of the delays in handling the Ore from the docks to the furnaces. Should September's movement be duplicated in October, which is not at all likely, the total would be only 18,000,000 tons, and the shippers to make the 20,000,000 tons, for which they are aspiring, would have to bring down 2,000,000 tons during November, which is a greater task than they care to attempt. The rates this week have increased slightly for carrying Ore. Marquette has advanced to 75c. under the pressure of the demand for boats. Duluth holds steady at 90c. with few boats available, and Escanaba is stable at 60c.

**Pig Iron.**—The prices of Foundry Iron have advanced during the week until now the minimum quotation on No. 2, in the valley, is \$13.75. Very little No. 2 is to be had for less than \$14, and some sales are named as high as \$14.25. The usual differential of 5c. applies on sales of No. 1. Southern Irons are holding still at \$14.70 on the Cleveland market, although another advance of 50c. is expected this week. A notice that such has been agreed to has been received, but the sales agents have not received their instructions so far. The sale of Foundry has been very heavy all during the week, and it is now almost impossible to obtain deliveries on material before the first of next year. Some good sized contracts have been taken in the last two weeks which require deliveries well on into next year. On these contracts the prevailing prices of the market apply. Bessemer Iron is selling heavily to the first of the year. Although the demand is enormous for it up to that time no contracts have been made which require delivery after January 1. The buyers are holding back on that for some reason. This week several orders of 3000 tons each have been taken. Basic has also been sold quite freely, and an aggregate tonnage of 10,000 tons has been covered during the week. Bessemer is quoted at \$15.25 in the valley, and Basic at \$14.25 in the valley. Basic deliveries are not offered inside of eight or ten weeks.

**Finished Material.**—All plants this week report that they are booking orders faster than they are making deliveries. The indication therefore is that the trade is still very active and the boom has all of the manifestations of permanency. The demand for Iron Bars is very active and the mills find it hard to meet the requirement. Although inquiries are heavy and the business large the producers have not taken advantage of the need of the consumer to force further changes in the prices. Bar Iron is therefore quoted at 1.55c., Youngstown, and Bar Steel at 1.60c., Pittsburgh. Sheets are also in demand, and the buying, which started with the resumption of work following the end of the strike, continues as heavy as at any time this fall. The prices have not changed in the least. The market still shows heavy buying of Steel Rails for delivery after the first of next year. There is quite a rush in fact, and the railroads seem now to be covering the greater part of their possible needs for next year. The price quoted universally is \$28. Plate sales of late have been moderate owing to the position in which the mills find themselves. No order placed now can possibly receive attention in less than four or five weeks, and some of the Pittsburgh mills are not even able to do that well. This is sending some of those who need material badly to other markets to get their supply. On Light Plates the situation is even worse. Mills are not making promises at all on de-

liveries, and in many instances are positively refusing orders. Structural Material is active, the mills being congested with orders. A possible relief for some of the mills may be expected with the close of the building season. The offer generally made on the market is that deliveries will not be made before the middle of December, although some of the plants are able to do better than that, being in position to make deliveries during the latter part of November. Billets are inquired after diligently. Small Billets are still the same as off the market, with larger sizes also scarce. The quotations now predominating are \$30 on small Billets and \$28 on the larger sizes.

**Old Iron.**—The demand for Scrap this week has been very heavy and a general advance in prices has been made, ranging about \$1.50 a ton. The following quotations are made: No. 1 Wrought, \$16.50 net; Cast Borings, \$8 gross; Wrought Turnings, \$12.25 gross; Cast Scrap, \$13 net; Stove Plate, \$10 net; Heavy Steel, \$17 gross; Steel Rails, \$17 gross; Old Iron Rails, \$22 net; Old Steel Axles, \$19 gross; Old Car Wheels, \$17 gross.

## St. Louis.

CHEMICAL BUILDING, October 9, 1901.—(By Telegraph.)

**Pig Iron.**—The past week in Pig Iron circles has been a very active one and the influences ruling are considered in every way favorable. The heavy demand continues and the recent advance in prices does not seem to affect the buying power. We quote as follows for cash, f.o.b. St. Louis:

Southern, No. 1 Foundry.....	\$14.75 to \$15.00
Southern, No. 2 Foundry.....	14.00 to 14.25
Southern, No. 3 Foundry.....	13.50 to 13.75
Southern, No. 4 Foundry.....	13.00 to 13.25
No. 1 Soft.....	14.50 to 14.75
No. 2 Soft.....	14.00 to 14.50
Gray Forge.....	13.00 to 13.25

**Bars.**—An advance in Iron Bars has been announced, making the price 1.75c., St. Louis. Notwithstanding the advance in prices the pressure in the demand continues on a large scale. Jobbers meet the advance by quoting 2.10c. at store. It is said that the number of small buyers who have been holding back and are now hastily placing their orders is large. We quote: Iron Bars, 1.75c. to 1.85c.; Steel Bars, 2c. Jobbers quote Iron Bars, 2.10c. to 2.15c.; Steel, 2.10c. to 2.15c., full extras.

**Rails and Track Supplies.**—The demand for all weights of Rails continues on a very heavy scale and the time of delivery is now the most important consideration. The leading mills, it is said, are booked full of orders far beyond January 1. The demand for Track Supplies rules good. We quote: Splice Bars, 1.75c. to 1.95c.; Bolts, with Square Nuts, 2.75c. to 2.90c.; with Hexagon Nuts, 2.90c. to 2.95c.; Spikes, 2c. to 2.05c.

**Pig Lead.**—A good demand continues in the Pig Lead market, with prices ruling the same. Soft Missouri at 4.25c. to 4.25½c., and Chemical at 4.30c. to 4.35c.

**Spelter.**—The prices of Spelter have again advanced on heavy transactions; 4.05c. is reported bid, with light offerings at that figure.

## Birmingham.

BIRMINGHAM, ALA., October 7, 1901.

The Iron market the past week showed a keener demand, and prices were well maintained, especially for Foundry grades. There was some disappointment concerning these grades on the part of buyers, as some sellers could supply them only in small amounts. It is hard to say what interests are most unfortunate in demand. They are all in want of Iron and sellers have difficulty in supplying it. Prices have been held very firmly, and if any concessions have been made they have been kept very secret. The market has been on the basis of \$11 for No. 2 Foundry, with special brands bringing a premium over that price. No. 1 Foundry is \$12, No. 1 Soft is the same price, and No. 2 Soft is strong at the price of No. 2 Foundry; No. 3 Foundry is \$10.50 and No. 4 Foundry is \$10 to \$10.25, Gray Forge has in some instances moved up to \$10, and at this writing it looks as if that

was bottom for it. In fact the demand opens with such activity this week that a further advance seems assured, and your correspondent was told by some of "the leading lights" in the trade that he could confidently predict an advance before the end of the week. It seems singular that while we have been recording an advance in Iron for the past few weeks that the miners' wages have been decreased. But this is explained by the fact that the September sales were mainly of the low grades, which decreased the average price. With the leading interest this average was under \$10. The rolling mills were the principal buyers, and for the grade desired Gray Forge led all the rest. The buying is extending into the coming year and confidence in the market seems to be increasing. The Western buyers seem to be for the time being at least influential factors. For Steel there is a good demand, and there is no accumulation of stocks. But just what it is bringing is anything but an open secret.

The demand for Coal is still good, but the scarcity of cars to move it is a matter yet of serious complaint. To move the Coal cars must be at the mines when it is ready to transfer. Any delay in this respect diminishes the output and decreases the revenue of operators. For the past three or four years the various roads have been largely adding to their equipment, but only to find that business offering was ahead of facilities to accommodate it. We have not a single road here now that can promptly care for all the business tendered to it. Shortage of cars is in every shipper's mouth. The increased shipments in every line tell the story. While we have been adding to our industries in all lines we have but just commenced. Large enterprises are projected, and barring financial disasters we will soon be in the front rank of the manufacturing centers.

## Pittsburgh.

HAMILTON BUILDING, October 9, 1901.—(By Telegraph.)

**Pig Iron.**—The Pig Iron market is very firm, and Standard Bessemer for the balance of the year's shipment is strong at \$15.25 at furnace or \$16, Pittsburgh. The United States Steel Corporation have made further purchases of both Bessemer and Basic for November shipment. The price of the Bessemer was \$15.25 and the Basic \$14.25, at furnace. There is very little Basic Iron available for October or November, and some Basic for spot shipment has sold at very close to \$15 at Valley furnace. Gray Forge is very firm and Valley furnaces are holding it at \$13.50 at furnace or \$14.25, Pittsburgh. Local Forge Iron, however, could probably be bought at \$13.75 to \$14, Pittsburgh. The heavy purchases of Foundry Iron have greatly strengthened the market, and prices are higher. We quote: Standard Bessemer Iron, in small lots from outside furnaces, \$15.10 to \$15.15, Valley furnaces, or \$15.85 to \$15.90, Pittsburgh. Furnaces comprising the Bessemer Furnace Association are holding Bessemer Iron firmly at \$15.25 at furnace. We quote Gray Forge at \$13.75 to \$14.25, Pittsburgh; No. 1 Foundry is \$14.75 to \$15; No. 2 Foundry, \$14.25 to \$14.50, and No. 3, \$14 to \$14.25. We note a sale of 1000 tons of Standard Bessemer Iron at \$15.10 at furnace, or \$15.85, Pittsburgh. Sales of 3000 or 4000 tons of Standard Bessemer Iron, for delivery in first quarter, have been made at \$15 at furnace.

**Billets.**—Small lots of prompt Steel are being sold from \$26.50 to \$27.25, Pittsburgh, several sales at the latter price being reported. No large lots of Billets have recently been sold, and buyers are not buying ahead at these prices. It is said that Steel is being sold for delivery into next year on a sliding scale basis, at prices \$3 or \$4 a ton below what is quoted for prompt Steel.

**Rods.**—The market on Rods is reported to be a little firmer, and we quote \$32.50 to \$33, Pittsburgh, depending on the order.

**Ferromanganese.**—We quote 80 per cent. German Ferro at \$52.50, Pittsburgh.

(*By Mail.*)

**Bars.**—The fixing of the price of Steel Bars at 1.50c. minimum does not seem to have diminished the demand

to any extent, as the mills advise us that a heavy tonnage is being placed. Some of the implement makers have recently placed some good sized contracts, and a good deal of tonnage was placed before the recent advance was made. Steel Bars in small lots for prompt shipment bring as high as 1.60c. at mill. We quote at 1.50c. in carloads and 1.60c. for small lots, with \$2 advance on Open Hearth Steel, and the regular advance made by the mills on high carbons and shapes. We quote Common Iron Bars at 1.55c., Pittsburgh, half extras. Stocks of Bars all over the country are very light, and quick delivery is in many cases hard to obtain.

**Structural Material.**—A good deal of work is in sight. A new bridge will probably be built at Beaver, and the Farmers' Deposit Bank Building in this city will soon be started. This will take about 5000 tons. There is some inquiry for material for foreign shipment. It is stated that two or three of the mills composing the Beam pool are favorable to an advance in prices, and it is possible it may be made before long. We quote: Beams and Channels, up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6 inches, 1.60c.; smaller sizes, 1.55c. to 1.60c.; Zees, 1.60c.; Tees, 1.65c.; Steel Bars, 1.50c., half extras, at mill; Universal and Sheared Plates, 1.60c. All above prices are f.o.b. Pittsburgh.

**Sheets.**—Deliveries of Sheets are reported to be somewhat better, but they are still very hard to obtain for shipment within 60 days. Some of the outside mills have entered a good deal of tonnage in Sheets for shipment in first quarter and first half of 1902. No fixed price was made on these contracts, but prices to be paid by the buyers are to be the same as those in force at the time of delivery by the leading Sheet interest. We quote No. 27 Black Sheets, box annealed, one pass through cold rolls, in carload lots and for shipment within 60 to 90 days, at 3.15c. to 3.25c.; No. 28, 3.25c. to 3.35c. In small lots of a few bundles and for shipment out of stock, as high as 3.50c. is obtained for No. 27, and 3.25c. for No. 28. Prices of the American Sheet Steel Company are as follows on lots of 500 bundles or more of Black Sheets, one pass through cold rolls: Nos. 10, 11 and 12, 2.30c.; Nos. 14 and 15, 2.40c.; Nos. 16 and 17, 2.50c.; Nos. 18, 19, 20 and 21, 2.60c.; Nos. 22, 23 and 24, 2.70c.; Nos. 25 and 26, 2.80c.; No. 27, 2.90c.; No. 28, 3c.; No. 29, 3.15c.; No. 30, 3.25c. On lots less than 500 bundles the American Sheet Steel Company will not make shipments except through jobbers, and for direct shipments from mill in less than carload lots an extra charge of 10c. per 100 lbs. is made. Galvanized Sheets are held at 70, 10 and 5 off in lots of 500 bundles and over, and at 70 and 10 in smaller lots. The outside mills quote Galvanized at about 70 and 10 off in carloads for shipment in the next 60 days.

**Muck Bar.**—The market is quiet. We quote Standard grades of Muck Bar at \$29.50, f.o.b. cars Pittsburgh. A sale of 1000 tons is reported at a price equivalent to the above.

**Rods.**—The market is quiet and only fairly strong. We quote Bessemer Rods at \$32.50, f.o.b. cars Pittsburgh.

**Rails.**—The statement printed last week as to new tonnage of Rails already booked by the mills for next year caused very favorable comment as to the outlook for this important branch of the Steel industry for next year. The Edgar Thomson Rail mill is making some great records and turned out last month about 60,000 tons of Rails. We quote at \$28, at mill.

**Plates.**—The Plate Association met last week and renewed the agreement for another year. It is claimed there never has been an agreement which has been so satisfactory as the one among the Plate mills. No change was made in prices or terms. Tonnage in Plates is only fair and some of the mills are short of work. It is hoped, however, that demand will soon pick up. We quote: Tank Plate,  $\frac{1}{4}$ -inch thick, up to 100 inches in width, 1.60c. at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, Ordinary Fire Box, American Boiler Manufacturers' Association specifications, 1.80c.; Still Bottom Steel, 1.80c.; Locomotive Fire Box, not less than 2.10c., and it ranges in price to 3c. Plate more

than 100 inches wide, 5c. extra per 100 lbs. Plate 3-16 inch in thickness, \$1 extra; gauges Nos. 7 and 8, \$3 extra; No. 9, \$5 extra. These quotations are based on carload lots, with 5c. extra for less than carload lots. Terms, net cash in 30 days.

**Merchant Steel.**—There is a good demand and prices are firm. We quote: Tire Steel, 1.60c.; Toe Calk, 1.85c.; Sleigh Shoe, 1.90c.; Steel Bars, 1.50c., base; Hammered Lay Steel, 3.75c.; Open Hearth Spring, 2.75c.; Tool Steel, 6c. and upwards, at maker's mill, depending on quality.

**Coke.**—There is a great scarcity of cars in the Coke region and shippers are complaining. The output of Coke last week in the Connellsville region was about 225,000 tons. We quote strictly Connellsville Furnace Coke at \$1.75 to \$2 and 72-hour Foundry at \$2.25 to \$2.50 a ton. Main Line Furnace Coke is firmer, and we quote at \$1.65 to \$1.75, and Foundry at \$1.90 to \$2.

**Tubular Goods.**—The market is very strong and demand is heavy. Mills are catching up to some extent with back orders. The market is difficult to quote, as prices named by the outside mills depend altogether on the nature of the order and delivery wanted by the buyer. Prices quoted by the leading Tube interest to consumers in carload lots are as follows:

	<i>Merchant Pipe.</i>	
	Per cent. Black.	Per cent. Galvd.
3/8 to 1/2 inch and 11 to 12 inch.....	61	48
3/8 to 10 inch.....	68%	56
<i>Casing, Random Lengths.</i>		
2 to 3 inch.....	58	53½
3/4 to 4 inch.....	63	59
4/4 to 12½ inch.....	65	61½
<i>Casing, Cut Lengths.</i>		
2 to 3 inch.....	53½	59
3/4 to 4 inch.....	59	55
4/4 to 12½ inch.....	61½	57½
<i>Boiler Tubes.</i>		
Steel.	Up to 22 feet.	
1 inch to 1 1/4 inch and 2 1/4 inch to 5 inch, inclusive....	65½	
2 inch to 2 1/4 inch, inclusive.....	60	
6 inch and larger.....	59	
Iron.	Per cent.	
1 inch to 1 1/4 inch and 2 1/4 inch.....	43½	
1 1/4 inch to 2 1/4 inch.....	43	
2 1/4 inch to 13 inch.....	53	

It should be noted that prices quoted by jobbers and outside mills on Tubular Goods for shipment within 60 days are somewhat higher than the above.

**Skelp.**—The market is firm and there is a very active demand. We quote Grooved Iron Skelp at 1.97½c. and Sheared at 2c. to 2.05c. Grooved Steel Skelp is 1.90c. and Sheared about 1.95c.

### Cincinnati.

FIFTH AND MAIN STS., October 9, 1901.—(By Telegraph).

The buying movement which has been in progress for the past three weeks shows no signs of quitting. Mails are well freighted with inquiries and the business in sight points to good, steady trading for the next week at least. Most furnace interests are now fully sold up for this year on all grades. The bulk of the present buying is for the first half of next year. A very remarkable feature of the situation is the conservative stand taken by the sellers in regard to prices. Usually prices advance rapidly in the face of such a buying movement as the present one, but now there seems to be a disposition to advance slowly. A few Southern furnaces have advanced prices 25c., but are in consequence selling no Iron. A few outside interests are said to be giving away their differential of 25c. in freight rate. The market is, nevertheless, on the basis of \$11, Birmingham, for No. 2, and strong and steady at that. An advance to possibly \$11.50 would not surprise the trade, and it will likely come soon. Freight from Birmingham is \$2.75 to this point; from Hanging Rock district, \$1.10. We quote, f.o.b. Cincinnati:

Southern Coke, No. 1.....	to \$14.25
Southern Coke, No. 2.....	to 13.75
Southern Coke, No. 3.....	to 13.25
Southern Coke, No. 4.....	to 12.75
Southern Coke, No. 1 Soft.....	to 14.25
Southern Coke, No. 2 Soft.....	to 13.75
Southern Coke, Gray Forge.....	to 12.75
Southern Coke, Mottled.....	to 12.75
Ohio Silvery, No. 1.....	\$14.60 to 15.00

Ohio Silvery, No. 2.....	14.10 to 14.60
Lake Superior Coke, No. 1.....	15.10 to 15.35
Lake Superior Coke, No. 2.....	14.60 to 15.10
Lake Superior Coke, No. 3.....	14.10 to 14.60
Southern Basic.....	to 14.75

### Car Wheel and Malleable Irons.

Standard Southern Car Wheel, chilling grades .....	\$18.25 to \$18.75
Standard Southern Car Wheel, No. 2 .....	17.25 to 17.75

Lake Superior Car Wheel and Malleable 18.50 to 19.00

**Plates and Bars.**—No change to note; the market is strong and active. We quote, f.o.b. Cincinnati: Iron Bars, in carload lots, 1.65c., with half extras; same in small lots, 1.85c., with full extras; Steel Bars, in carload lots, contract delivery, 1.62c.; same for prompt delivery, 1.70c. to 1.75c.; Base Angles, in carload lots, 1.80c.; Plates, 1/4-inch and heavier, 1.90c. to 2c.; 3-16 inch, 2.10c.; Sheets, No. 16, 2.90c. to 3c.

**Old Material.**—The market has been steady and fairly active, with no change in price. We quote dealers' buying prices, f.o.b. Cincinnati, as follows: No. 1 Wrought Railroad Scrap, per net ton, \$14 to \$14.50; Cast Railroad and Machine Scrap, \$12.25 to \$12.75; Iron Axles, \$19 to \$20; Iron Rails, \$17.25 to \$18.25; Steel Rails, rolling mill lengths, \$14.75 to \$15.25; short lengths, \$13.75 to \$14; Car Wheels, \$17 to \$17.50. All prices except No. 1 Wrought on the basis of gross tons.

### New York.

NEW YORK, October 9, 1901.

**Pig Iron.**—Some large inquiries are in the market, but so far as we can learn no important contracts have been closed. There has been the usual rush of shipments from the furnaces and those consumers who stock up for the winter before the close of navigation. This, it is claimed, accounts at least partly for the falling off in the stock of Eastern furnace companies. We quote: Lehigh, Schuylkill and Virginia Irons, No. 1, \$16 to \$17.50; No. 2 X, \$14.75 to \$15.75; No. 2 Plain, \$14 to \$14.50; Gray Forge, \$14 to \$14.50; Tennessee and Alabama brands, No. 1 Foundry, \$15 to \$15.50; No. 2 Foundry, \$14.75 to \$15; No. 1 Soft, \$14.75 to \$15; No. 2 Soft, \$14.50 to \$14.75; No. 3 Foundry, \$13.75 to \$14; No. 4 Foundry, \$13.50 to \$13.75; Gray Forge, \$13.25 to \$13.50.

**Cast Iron Pipe.**—While no large contracts are coming up, the demand for small lots continues unabated, at the heavy rate which has characterized it for many months past.

**Steel Rails.**—There are continued reports of sales for next year's delivery, and it is even intimated that later on the price may be advanced. We continue to quote \$28 for Standard Sections at Eastern mill.

**Finished Iron and Steel.**—No noteworthy contracts are reported in Structural Material. It is observed, however, that the deliveries of Material are becoming better. We quote as follows at tidewater: Beams, Channels and Zees, 1.75c. to 1.80c.; Angles, 1.75c. to 1.80c.; Tees, 1.80c. to 1.85c.; Bulb Angles and Deck Beams, 2c.; Sheared Steel Plates are 1.80c. to 1.85c. for Tank, 1.90c. to 1.95c. for Flange, 2c. to 2.05c. for Fire Box. Charcoal Iron Plates are held at 2.25c. for C. H. No. 1, 2.75c. for Flange, and 3.25c. for Fire Box. Refined Bars are 1.60c. to 1.65c.; Soft Steel Bars, 1.62½c. to 1.65c.

### Metal Market.

NEW YORK, October 9, 1901.

**Pig Tin.**—During the early portion of the week under review the market here for spot Tin was bid up to 24.70c., but it broke sharply on Monday, declining to 23.75c. There was a recovery to-day, however, the market closing 24.40c. to 24.50c. Futures, especially for next year's delivery, sold as low as 23.50c., and closed to-day at 23.50c. to 23.70c. Business during the week was very light, as the principal consumers are pretty well covered for the balance of this year. In London the market for spot declined to £109 10s., and to-day advanced to £112 5s., which was the closing price to-day. Futures, however, show a heavy decline since last week. To-day's closing price was £106 17s. 6d. The discount

on futures, which a short time ago was less than £2, is now above £5. This is attributed to free offerings and the pressure to sell from the Straits, where stocks were accumulating during the period of our Steel strike.

**Copper.**—Consumers still show a hesitancy in engaging for forward delivery. Purchasing is going on entirely on a hand to mouth basis in all brands. As Lake Copper is mostly engaged from the larger producers, consumers needing prompt delivery are forced to pay the price asked, which is 16½c. to 17c. With Electrolytic it is different. For, while the large producers ask 16½c., some producers are selling at lower prices. We hear of sales as low as 16.30c. In Casting, the standard brands are held at 16½c., but other brands are to be obtained at lower figures, in some instances the price being as low as 15½c. The London market has declined somewhat since last week, especially for futures, which are now 10 shillings below spot. The close in London to-day was cabled £63 15s. for spot and £63 5s. for futures. Best Selected is unchanged at £72. Exports this month have started on a rather small scale, the total for the first eight days of the month being 1400 tons. Imports during the same period aggregated 700 tons.

**Pig Lead**—Is very quiet at unchanged prices. There is still considerable talk about the great producing interests having large stocks on hand. The American Smelting & Refining Company continue to quote on a basis of 4.37½c. for Desilverized, New York, and 4.32½c., St. Louis. The London market has advanced a shade, to-day's price being £11 15s.

**Spelter**—Has advanced considerably. Prices to-day were quoted 4.20c. to 4.25c. St. Louis was quoted 4.05c. The cause to which the Western interests ascribe this advance is a rumor circulated in the West which purports that the United States Steel Corporation have taken options on the principal producing plants. It is even said that these options expire on the 15th of this month, and that there is a possibility of their being extended in case the plants should not be transferred before that time. The accuracy of this report is greatly questioned by the most prominent men in the trade here. They say that the real cause of the advance is Western manipulation, and explain this by stating that certain large interests there had a considerable amount of the metal turned back on them during the Steel strike, and that now they are endeavoring to bring the figure up to a good point, so that they can come out easily. It is not believed that the United States Steel Corporation have any desire to control any of the Spelter plants other than the Edgar Works, which they now own in fee. The London market has advanced to £17 2s. 6d.

**Antimony**—Is unchanged. Hallett's is quoted 8½c.; Cookson's 10¼c. Outside brands are sold 8½c.

**Nickel**—Is unchanged, prices continuing on a basis of 60c. for lots not covered by yearly contracts.

**Quicksilver**—There is no change. The price quoted is \$51 per flask of 76½ lbs., in lots of 50 flasks or more. The London market is unchanged at £9.

**Tin Plate**—The London prices have declined to 14 shillings 4½ pence. This market is unchanged, the American Tin Plate Company quoting on a basis of \$4.19 per box of Standard 100-lb. Cokes, f.o.b. New York, or \$4, f.o.b. mill.

**Pittsburgh Stove & Range Company**.—PITTSBURGH, PA., October 9, 1901.—(By Telegraph.)—The Pittsburgh Stove & Range Company have signed a contract with the Board of Trade of Beaver Falls, Pa., by which all the foundries of the Pittsburgh Stove & Range Company will be removed to Beaver Falls. The concern have acquired a site of 23 acres and plans are now being drawn for the large new foundries which are to be built. At the present time the Pittsburgh Stove & Range Company are operating five stove foundries. Three of these, the Anschutz-Bradberry, De Haven and Bissell works are at Allegheny, the Graff works at Monongahela City, and the Baldwin and Graham works at New Castle. All these five plants will be removed to Beaver Falls and rebuilt on a larger scale.

### American Bicycle Company.

At the meeting of the stockholders of the American Bicycle Company, held on Tuesday last, the annual report showed a surplus of \$956,262, which is a shrinkage of \$1,012,233 as compared with the report issued a year ago.

In the item of "plant investment" in the balance sheet, the figures are \$28,546,851, "less depreciation," \$979,026, giving the net result of \$27,567,824. The balance sheet as of August 1, 1901, is as follows:

Assets.	
Plant investment.....	\$27,567,824
Cash .....	380,766
Accounts and notes receivable.....	3,934,153
Investments in securities.....	3,843,535
Merchandise on hand.....	3,948,440
Unexpired insurance, &c.....	53,786
Total.....	\$39,728,506
Liabilities.	
* Debentures .....	\$9,500,000
† Preferred stock.....	9,294,900
‡ Common stock.....	17,701,500
Accounts and notes payable.....	2,245,843
Factory bonds and mortgages.....	30,000
Surplus .....	956,262
Total.....	\$39,728,506

\* \$500,000 retired in March, 1901.

† \$705,100 in treasury deducted.

‡ \$2,298,500 unlisted and held in treasury.

The report of the treasurer shows a surplus to the credit of the profit and loss account, on July 31, 1901, of \$956,262.30, and profits for the current year of \$850,682.59.

The quick assets of the company amount to \$12,106.895.21, from which, after deducting accounts and notes payable, \$2,245,843.97, there is left \$9,861,051.24, against outstanding debentures of \$9,500,000. The plant investment account, after allowing for a depreciation of \$979,026.89, stands at \$27,567,824.41, against outstanding preferred stock, \$9,294,900; common stock, \$17,701,500; total, \$26,996,460. The report of the president contained the following:

Starting with 28 bicycle factories, the manufacture of bicycles has been gradually concentrated in ten factories. Each year there has been a concentration of selling departments, and now we have arranged three general sales departments in New York, Chicago and San Francisco respectively, each one of which will sell all our make of bicycles in its own territory. The manufacturing and selling of bicycles will be under the direction of one officer.

The Automobile Department has been gradually developing, and is now on a profit paying basis. At our factory in Indianapolis the Waverley, our electric automobile, is manufactured. At Toledo, Ohio, we have the largest and finest automobile factory in the world, at which is manufactured our steam automobile. Our product of both types is now about 50 per week. The gasoline type of wagon upon which we have been working is perfected and will soon be ready for the market. An accepted model of the electric delivery wagon is completed, and in the next few months will be ready for our customers. Steam trucks with a carrying capacity of 4 tons and over are being built, on orders, at the Toledo factory.

The Automobile & Cycle Parts Company, organized and taking in all our six parts factories in January last, is proving a success and is already upon a dividend paying basis.

The National Battery Company, owing the Sperry battery, are now located in one of our Buffalo factories, which had been discontinued as a bicycle factory, and if it is sufficient to say have more orders and contracts on their books than they can fill in the next six months.

The American Wood Rim Company, to whom we sold our wood rim plant at Plymouth, Ind., and in which we are large stockholders, are in flourishing condition and paid on the past year's business a dividend of 10 per cent.

The Auto-Street Sweeper Company, in which we own a controlling interest, are a new enterprise. The manufacture of the machine will give our factories a large amount of work. A perfected model is now being completed at Toledo.

Several of the factories discontinued as bicycle factories have been utilized for the manufacture of automobiles and batteries; the balance have been sold or rented, so that at the present time we have but one factory that is standing unoccupied and idle.

The following officers were elected: President, R. L. Coleman; vice-president, J. E. Bremley; secretary, C. W. Dickerson; chairman of the Board of Directors, Alfred A. Pope. The following directors were elected for a term of three years: H. A. Lozier, A. Featherstone, William Barbour, J. C. Bromley, Otto Unzicker. The two last named succeed R. S. Crawford and E. C. Stearns.

## QUOTATIONS OF IRON STOCKS DURING THE WEEK ENDING OCTOBER 9, 1901.

Cap'l Issued.	Thursday.	Friday.	Saturday.	Monday.	Tuesday.	Wednesday.	Closing	Sales.
							quotations.	
\$10,000,000	Am. Bicycle Co., Com.	2 - 2½	.....	.....	2½ - 3	.....	.....	1,300
20,000,000	Am. Bicycle Co., Pref.	10 - 10½	.....	.....	12½ - 13½	.....	.....	1,700
10,000,000	Am. Bicycle Co., Bonds.	.....	.....	.....	.....	.....	.....	.....
29,000,000	Am. Car & Foundry, Com.	25 - 26	23½ - 24%	- 24%	24½ - 25	24½ - 25½	25½ - 25½	25½ 20,700
29,000,000	Am. Car & F'ndry, Pref. \$.	79½ - 80%	78 - 79½	- 80	79½	80 - 81	- 81	81 2,950
7,500,000	Bethlehem Iron†.	72½	.....	.....	61½	- 61	.....	100
15,000,000	Bethlehem Steel‡.	.....	.....	.....	.....	.....	.....	.....
7,974,550	Cambria Iron, Phila.*	- 47½	.....	- 47½	- 47	.....	.....	50
45,000,000	Cambria Steel*.	25½ - 25½	25 - 25½	- 25%	25 - 25%	25½ - 25%	- 25½	..... 8,000
23,000,000	Colorado Fuel & Iron.	91½ - 93½	90 - 91%	90½ - 92	88½ - 92	.....	91 - 92	..... 8,430
24,410,900	Crucible Steel, Com.	.....	.....	.....	.....	.....	.....	.....
24,399,500	Crucible Steel, Pref.	.....	.....	.....	.....	.....	.....	.....
1,975,000	Diamond State Steel  \$.	.....	- 2%	.....	- 2%	2% - 2%	.....	600
15,000,000	International Pump, Com.	- 45	43 - 45	- 44%	- 44	44 - 45	- 44	44 2,000
8,850,000	International Pump, Pref.	.....	.....	.....	.....	.....	.....	.....
11,000,000	International Silver.	6½ - 6¾	- 6½	.....	.....	.....	.....	300
10,750,000	Penna., new, Com., Phila.	.....	- 44%	.....	.....	.....	.....	100
16,500,000	Penna., new, Pref., Phila. \$.	- 86	- 86	- 85½	- 85	.....	.....	350
12,500,000	Pressed Steel, Com.	37½ - 39	37 - 38½	38 - 38½	- 37%	- 38	- 38%	38% 3,600
12,500,000	Pressed Steel, Pref.	78 - 80	76 - 77	- 76½	.....	.....	.....	960
27,191,000	Repub. Iron & Steel, Com.	15 - 15½	14½ - 15	14% - 14%	14½ - 14½	14½ - 14½	14½ - 14½	14½ 6,900
20,306,900	Repub. Iron & Steel, Pref.	66 - 66%	65½ - 66%	65½ - 65½	64 - 65½	64 - 64½	.....	4,400
7,500,000	Sloss-Sheffield S. & I., Com.	.....	.....	.....	.....	.....	.....	.....
6,700,000	Sloss-Sheffield S. & I., Pref. \$.	- 70	.....	.....	.....	.....	.....	100
20,000,000	Tennessee Coal & Iron.	59 - 62	58½ - 59½	58½ - 60	56½ - 58½	58 - 59½	58 - 58½	58½ 21,700
1,500,000	Tidewater Steel  .	- 6	6½ - 6¾	.....	.....	.....	.....	250
510,361,300	U. S. Steel Co., Com.   .	43 - 43%	42½ - 43½	42½ - 43½	41½ - 42½	42 - 42½	42½ - 42½	42% 139,600
508,511,200	U. S. Steel Co., Pref.   .	93% - 94	92½ - 93½	92½ - 93%	92 - 92½	92½ - 93	92½ - 93½	92% 57,200
1,500,000	Warwick I. & S.   .	6½ - 6¾	6½ - 6¾	- 6½	- 6½	6½ - 6¾	- 6½	..... 650

Preferred stocks 7% cumulative unless otherwise stated. \$7 x Non-Cu. \$8 New stock. 1 Par \$10. 1½ Par \$50. \$1 paid in. II Authorized Capital \$550,000,000 Common; \$555,000,000 Preferred; \* Par \$50. † 6% guaranteed by Beth. Steel Co. Late Philadelphia sales by telegraph. ‡ Ex-dividend.

**Bonded Indebtedness:** American Bicycle Co., \$10,000,000 sinking fund gold debentures 5%; Cambria Iron Co., guaranteed 4% per annum on \$50 par by Cambria Steel Co.; Cambria Iron Co., \$218,000 6% debenture 20-year bonds, 1917, payable option 5 years, assumed by Cambria Steel Co.; Diamond State Steel Co., property leased from Diamond State Steel 5% at 4% on \$1,000,000. \$7.50 on Steel stock paid in, total capital \$2,000,000; International Pump: Blake & Knowles S. P. Co. \$1,000,000 6%; Tennessee C. I. & R. R. Co., \$8,000,000 5%, \$8,367,000 6%; \$1,114,000 7%; \$1,000,000 7% cu. pref.; Pennsylvania Steel, \$1,000,000 5% Steelton 1st, 1917. \$8,000,000 5% Sparrow's Point 1st, 1922. \$4,000,000 consolidated, both plants; Bethlehem Iron, \$1,351,000 5% maturing 1907, interest and principal guaranteed by Bethlehem Steel Co.; Republic Iron & Steel, none; Warwick Iron & Steel, none; Colorado Fuel & Iron Co., Col. Fuel Co. Gen. Mort. 6% \$890,000, Col. Coal & Iron Con. Mort., 6% \$2,411,000, Col. Fuel & Iron Gen. Mort. 6% \$2,674,000, also outstanding \$4,000,000 preferred stock; Sloss-Sheffield St. & I. Co., Sloss I. & S. first mortgage 6%, \$2,000,000, Sloss I. & S. general mortgage 4½% \$2,000,000. U. S. Steel Corporation \$304,000,000 5% gold bonds, also Am. S. & W. Co. \$130,686, Federal Steel Co. \$9,892,000 Illinois 5%, \$7,417,000 E. J. & E. R. R. 5%, \$1,600,000 Johnson 6%, \$6,732,000 D. & L. R. R. 5%, \$1,000,000 2d D. & L. R. R. 6% \$10,000 land grant D. & L. R. R. 5%; National Steel \$2,561,000 6%.

## Iron and Industrial Stocks.

During the greater part of the week the iron stocks suffered to a moderate degree from the liquidation which took place in some of the industrial stocks. A number of the latter have fallen under the suspicion of the investing and speculating public and some sharp declines have taken place.

	Bid.	Asked.
E. W. Bliss, common.	140	140
E. W. Bliss, preferred.	130	140
Cramp's Shipyards stock.	79	82
Dominion Iron & Steel Company.	20½	...
Empire Iron & Steel, common.	2½	4
Empire Iron & Steel, preferred.	35	35
National Enam. & St., common.	26	28
National Enam. & St., preferred.	82	86
New Haven.	4%	4%
Otis Elevator, common.	28	29
Otis Elevator, preferred.	94	95
Pratt & Whitney, preferred.	.....	.....
U. S. Cast Iron Pipe Company, common.	5%	6½
U. S. Cast Iron Pipe Company, preferred.	25	30
U. S. Projectile.	125	...
Va. C. I. & C. stock.	7	8
Va. C. I. & C. bonds.	42	44
H. R. Worthington, preferred.	115	120
American Can Company, common.	21½	21½
American Can Company, preferred.	69½	70

We present elsewhere the report of the American Bicycle Company, one interesting feature of which is that the net quick capital of the company is \$9,861,051, as against \$9,500,000 of outstanding debentures. Since the profits were \$850,683, as compared with an interest charge of \$475,000, the debentures seem secure.

**Pressed Steel Car Company.**—F. N. Hoffstot, president of the Pressed Steel Car Company, has issued the following statement of earnings: "The net earnings of the company for the first quarter ending March 31 this year were \$439,330, of which \$306,603 was applied to the payment of the quarterly dividend on preferred stock and interest charges and depreciation, leaving a net surplus for the first quarter of \$132,727 for the common stock. The net earnings for the second quarter, ending June 30, were \$642,369, of which \$290,780 was applied to the payment of the quarterly dividend on the preferred stock and interest charges and depreciation, leaving a net surplus for the second quarter of \$351,589

for the common stock. This shows a total surplus for the first six months of this year, after paying preferred dividends and making deductions for all interest charges, depreciation, &c., of \$484,316 for the common stock. The prospects for business, both at home and abroad, are very good, and we are in hopes the coming quarterly statement will indicate even better results."

Whitaker & Co. of St. Louis are offering \$500,000 of the National Enameling & Stamping Company's \$2,500,000 first mortgage 5 per cent. gold bonds, dated September 1, 1901, denomination \$1,000, maturing \$250,000 yearly, beginning September 1, 1902; interest (March 1 and September 1) payable in gold at the St. Louis Trust Company, St. Louis. Price par and accrued interest for those running from two to five years; 101 and accrued interest for those running from six to ten years.

John Pitcairn, president of the Pittsburgh Plate Glass Company, has issued a circular letter to the stockholders stating that payments for subscriptions to the 25 per cent. increase in the capital stock, amounting to \$2,500,000, at par, \$100, shall be 50 per cent. January 2, 1902, and 50 per cent. April 1, 1902. Mr. Pitcairn says that the surplus earnings, which now amount to \$6,500,000, are not sufficient to the company's requirements, hence the increase. Stockholders of record September 18 can subscribe for 25 per cent. of their holdings.

**Dividends.**—The directors of the Pittsburgh Coal Company of Pittsburgh last week declared the regular quarterly dividend of 1½ per cent. on the preferred stock, payable October 25.

The Philadelphia Company of Pittsburgh have declared a quarterly dividend on the common stock of 1½ per cent.

Cleveland Cliffs Iron Company have declared a quarterly dividend of 3 per cent., or \$3 per share, payable October 15.

There is no truth whatever in the report emanating from Birmingham that the Woodward Iron Company of Woodward, Ala., propose to put up a new blast furnace.

## The New York Machinery Market.

NEW YORK, October 9, 1901.

There was a slight falling off in the demand toward the end of the week under review. It was not enough to cause any feeling of uneasiness, however, as the inquiries that have been coming in for some weeks past have indicated a good amount of future business. In some quarters there is a little more apprehension shown than in others. Some merchants are becoming discouraged with the slowness with which they are meeting in their endeavors to have certain transactions closed. They also point to the fact that a number of machinery builders are reducing their forces and assert that this shows that the shops are not so crowded with work as the manufacturers would like to have it appear. Other prominent merchants point to the fact that their shops cannot deliver inside of several months, and cite advances to be placed alongside of the declines in other lines. Despite this diversity of opinion there is apparently a fair amount of business going through, and the prospects for future business seem to grow brighter rather than otherwise.

Foreign business in machine tools continues to grow worse. Fred L'H. Eberhardt of the firm of Gould & Eberhardt of Newark, N. J., has just returned from a tour through England and the Continent. In speaking of conditions abroad he said: "I am afraid that we will never see a repetition of the demand from Germany unless business there should become so brisk that the German consumers would be forced to go abroad to satisfy their demands. The Germans admit that they were caught napping, but believe that they have recovered entirely and are able to take care of themselves for a while. The feeling toward Americans is not the friendliest, and they must become actually dependent upon us before we can expect to regain their trade. The reports regarding the duplication of American machine tools in Germany are not exaggerated. In fact, I think that the Germans have overreached themselves in copying American tools, for there are many concerns who are now building machines very similar to American types who will have to go under sooner or later, for there is not room for them all to exist. Certain tools that are made here by only one or two firms are copied in Germany by a number of concerns. The copies at present are good ones, but the concerns building them cannot all afford to keep up with the progress that is made by the American builders and quickly copied by the more important of the German manufacturers. Some of the tools built there would actually find a market in this country if it were not for the prohibitive tariff. In design they are good. This tariff is naturally an aggravation to the German manufacturers."

"Regarding the proposed German import tariff there is a diversity of opinion. Some of the important machinery importers are of the opinion that the thing will be kept alive until it comes time for the actual adoption, and that it will then be dropped. The machinery builders, who, by the way, are all strongly banded together into a protective organization, are working tooth and nail to have the schedule adopted. The organization that I speak of comprises almost all of the German machine tool builders. They meet regularly, I think, at Dusseldorf, and their sole aim is to prevent American competition. As a body and individually, they are very bitter against American machinery."

"Regarding the factories that have been erected in Germany for the purpose of producing American machinery, I do not think that they have been pre-eminently successful. The great 'Deutsche Niles' Fabrik are working hard to make the present works pay, rather than toward extending it any. The German Garvin shop was closed down for a month, but I understand that one of the German directors effected some sort of a reorganization and had the shop started up again in order to protect his own interests."

"In England I found a better prospect for future business, where a revolution is going on in which the American concerns who are operating works in England are figuring successfully. England seems to be taking on

a quicker pace, and we naturally are helping to set it and are reaping the attendant benefits. The English machinery builders are not so quick in taking up our ideas and working them out for themselves. They are more apt to take our goods and be satisfied. Then there is no tariff barrier and no indication that any will be raised."

"In other European countries business is not very good, and as the German concerns previously pushed our goods and are now handling the German copies, that are sold much cheaper, I do not look for an increase in demand in the near future."

Considerable interest and some speculation is shown in the trade in reference to a report which seems to be well founded and which purports that the Acme Machine Screw Company of Hartford, Conn., are to remove their works to Cleveland, Ohio. It is evident from the various reports gleaned in the street that the Acme Company have either in process of consummation or have very recently negotiated some extensive transaction, the details of which have not been officially announced as yet. The most coherent report to be obtained in the trade is that the National Acme Machine Company, recently incorporated with a capital of \$750,000, are to absorb the Acme Machine Screw Company of Hartford, and the National Screw & Tack Company of Cleveland. The consolidated concerns are to erect a large new plant at Cleveland, or add to the present plant of the Cleveland Company, and are to build the line of Acme screw machines as formerly produced at Hartford, and produce machine screws for the trade as well. That the Acme Company are to consolidate with a Cleveland manufacturer of screws is generally admitted, and the concern referred to are said to be the most likely concern in Cleveland. The incorporators of the National Acme Machine Company are F. H. Goff and F. A. Foote.

In connection with the equipment of the new system of car shops which are now being constructed at Readville, Mass., by the New York, New Haven & Hartford Railroad, we understand that while the trade in general have not received the specifications for the requisite machinery, certain parties in Liberty street have already submitted figures. The parties referred to claim to have sent in their proposals several weeks ago, and are now of the opinion that the matter will be settled before the middle of next month. It is said that the list bid on comprises upward of \$150,000 worth of machine tools. As stated in this column last week, the buying is to be conducted by the purchasing department of the road at New Haven.

Another railroad shop proposition came to the front during the last week. It was the Grand Trunk Railway Company that attracted attention. They are arranging to build new car shops at East Deering, Maine, and are sending out preliminary inquiries regarding machine tools. W. G. Brownlee, superintendent of the Eastern Division of the road, with offices at Rutland, Maine, is in charge of the work.

We are informed that plans are being prepared for another building to be added to the plant of the Singer Mfg. Company of Elizabethport, N. J. D. B. Provoost of Elizabeth, N. J., is the architect preparing the plans. It is not expected that the work will be started before spring.

Parties in the machinery trade are following up the L. S. Starrett Company of Athol, Mass., in connection with the new works which they are about to build. We are informed that contracts for the buildings have already been awarded. It is expected to have the buildings completed by April 1. There is to be a machine shop 50 x 162 feet, and a combined graduating department and office building 49 x 162 feet. There will also be a separate power house.

The Gulf & Strip Island Railroad Company have been among the heaviest purchasers of machine tools. They have purchased between \$10,000 and \$15,000 worth of machinery for installation in their repair shops, at Gulfport, Miss. While a good portion of this equipment was secured in this market a considerable portion was purchased in the Cincinnati district.

## The Chicago Machinery Market.

CHICAGO, October 5, 1901.

If anybody in the machinery trade is suffering from dullness or depression in business he is carefully concealing the fact. Manufacturers of all classes of machinery and dealers in machine tools differ in their reports only in degree. All are enjoying a good demand, while some state that their business was never better than they are finding it at this time. The country has not yet caught up with the demand for manufactured products, as business would be falling off in the machinery line if this were the case. Additions are still being made to manufacturing establishments, new and improved machinery is being substituted for that which is getting out of date, and fresh enterprises are steadily developing which call for mechanical appliances.

### The Engine Trade.

Engine builders state that the demand for heavy engines was never better. Those who are prepared to furnish engines of over 2000 horse-power have their capacity engaged far into the future, with still more work pressing itself on them to be taken care of. Builders of 500 to 1800 horse-power engines can in very few instances promise delivery earlier than nine months from the signing of the contract. They find much of this trade coming from power users who have outgrown their facilities and are obliged to purchase larger units. It is quite common for an establishment which has been relying on an engine of 200 horse-power to jump to one of 500. The increasing use of electricity is assisting in this development. While a heavy demand for engines comes from electric light and power plants, a great deal of business in medium sized engines is caused by the change in manufacturing plants, grain elevators, &c., to electric transmission, which usually brings about the purchase of a new engine to be directly connected to a generator. Manufacturers of engines under 200 horse-power are not sold so far ahead, being able to make deliveries in three or four months, but they are enjoying a very good demand. Two features of the engine trade are especially worthy of note. One is that the demand from abroad has fallen off, owing to the slack condition of trade in European engineering works, which has caused them to take engine contracts at very low prices. The other is that builders of engines are so busy that their agents no longer follow up new power projects and sit with them until the contracts are let, as the general demand keeps them too closely engaged to make such a proceeding necessary. Dealers in second-hand engines are profiting by the heavy demand for power generating appliances and are finding a ready market for everything in this line in fair condition.

### Electric Apparatus.

Manufacturers of electric apparatus are overrun with work. Installations of electric power are multiplying so rapidly that the builders of large generators are as far behind in making deliveries as the builders of heavy engines. The supply of small dynamos is short, and much inconvenience is experienced by those who defer purchasing dynamos or motors until they are actually needed. A railroad company the past week contracted for the electrical equipment of a shop which will require 1000 horse-power distributed through 20 motors running short shafts or individual machines, and it will probably be three or four months until the installation can be made, although needed much earlier than that.

### The Gas Engine Trade.

The gas engine trade increases in activity, instead of diminishing. A feature of this trade is the steadily expanding demand from railroad companies for gasoline engines to be used for purposes hitherto involving the use of wind mills, stationary steam engines or locomotives. Gasoline engines have long since been found to be economical generators of power for pumping water into tanks, but it is quite recently that they have begun to displace locomotives in hauling cars of coal up inclines to coal pockets for coaling locomotives. Such installations are not seriously expensive and the locomotives thus released are more profitably employed

in the regular railroad service. The general demand for gas and gasoline engines is steadily broadening. The charge is made that new engines now being brought out are too frequently being forced on the market by the low prices at which they are offered, instead of gaining the favor of users through their merits. Such engines are found unsatisfactory and the buyers are obliged to discard them. This is variously regarded by sellers of high grade and higher priced engines. One view is that the gas engine trade is injured, because users of these poor engines are likely to be disgusted with all gas engines and to turn to some other power. But another view is that the cheap engine is the beginning of a course of education which will ultimately lead to the selection of a higher priced machine.

### Mining Machinery.

Good orders are being placed for mining machinery, all works making a specialty of this class of product being very busy. The active condition of this trade has encouraged Milwaukee capitalists to organize a large undertaking to have a capital of \$600,000 for the purpose of manufacturing mining machinery exclusively. They are expected shortly to be in the market for their equipment. All other classes of machinery builders, such as manufacturers of molding machines, power transmission appliances, grinding and polishing machines, &c., are well employed and regard the future as most promising.

Some special features of the trade are set forth in the following items obtained from individual concerns:

The Marshall & Huschart Machinery Company, 62 and 64 South Canal street, report among other sales an order from the Monighan Machine Works, Chicago, builders of mining machinery, for one of the largest Bullard boring mills, which is to accompany a 72-inch planer recently sold to the same establishment by the company. Their sales in September included not less than ten Bullard boring mills. They sold Geo. Chaloner's Sons, Oshkosh, Wis., a good outfit, comprising a boring mill, large lathes, keyseaters, chucking machines and a number of small tools. They are now making a special line of tools for oil well repairs, and have just sold two full outfits of this character to go to the Indiana oil fields.

McDowell, Stocker & Co., 61 and 63 South Canal street, report their trade in machine tools in September fully as large as that of August. They received orders for good outfits of tools from machinery concerns who are now enlarging their plants and some from agricultural implement manufacturers who are preparing for the coming season. The general demand from machinery manufacturers for single tools has been very satisfactory. The firm are now improving their office facilities, taking in considerably more space for this purpose, giving the clerical force more room and securing greater convenience in transacting their business.

Manning, Maxwell & Moore, 24 to 30 South Canal street, are figuring on some heavy specifications for machine tools, and report inquiries of this character sufficiently numerous to give a healthy tone to trade. The volume of their business during the month of September was fair, but the demand has usually been for one or two tools instead of large outfits.

Hill, Clarke & Co., 11 and 13 South Canal street, report increasing business, their trade in September running in excess of that of August, when they reported the heaviest month trade in the history of this house. They are in receipt of numerous inquiries for tools from manufacturers who are contemplating the increase of their facilities for the purpose of meeting a greatly enlarged demand for their products. They look for advancing prices on the tools manufactured by the establishments which they represent as a result of the heavy increase in trade.

Chas. H. Besly & Co., 10 and 12 North Canal street, are very busy both in their Chicago store and Beloit factory, and are now engaged in making plans to enlarge the factory. They find the demand increasing for direct connected electrically driven Gardner grinders. An important contract was placed for such grinders the

past week by a large machinery manufacturing company. Orders for all classes of mill supplies, machinists' tools and other goods handled by this firm are coming in freely from all sections of the country. It is remarked that buyers are largely purchasing without asking for prices, probably fearing that if the question should be raised prices might be advanced. It is realized that prices of manufactured goods are really very low, as compared with the cost of raw material. It may be noted that a good index to the condition of manufacturing industries is the demand for lubricating oil. The Helmet oil manufactured by the firm is now in greater demand than at any previous time since it was placed on the market, which shows that much more machinery is being run.

The Otto Gas Engine Works, 326 Dearborn street, are enjoying a trade which taxes their facilities. They find the demand particularly heavy from railroad companies, who are adapting gas and gasoline engines to a much greater variety of work, finding them economical in certain branches of service, some of which have heretofore been performed by locomotives and others by steam plants. Among recent adaptation of the gas engine to railroad work is their use in operating locomotive turn tables.

The Stillwell-Bierce & Smith-Vaile Company, 305 Dearborn street, report a continued heavy demand for pumping engines and pumping apparatus. They are finding a specially satisfactory trade in air lift pumping installations in inland towns, whose water supply comes from drilled wells. They have recently had numerous inquiries from towns now operating such wells with pumps and who contemplate replacing the pumps with air lifts for the purpose of securing a larger volume of water. The company have also enjoyed much business as the result of additions which are being made to municipal pumping plants. This class of business is now nearing its end for the season, as the approach of winter cuts off further operations in this direction.

Granville Kimball, manager of the Chicago office of the Springfield Boiler & Mfg. Company, Marquette Building, reports an active demand for all classes of boiler and plate work. Recent boiler contracts include the following: American Distilling Company, Pekin, Ill., six 200 horse-power, internally fired, for 130 pounds pressure, equipped with Springfield rocking grates; Morgan & Wright, Chicago, two 200 horse-power, for 160 pounds pressure, fitted in front, in Dutch oven style, with the Detroit automatic stoker; Peerless Portland Cement Company, Union City, Mich., three 250 horse-power, for 130 pounds pressure; Loretto Iron Company, Loretto, Mich., one 250 horse-power, internally fired, for 160 pounds pressure; Washington Fuel Company, Farnsworth, Ind., one 100 horse-power; Evansville Light & Water Company, Evansville, Wis., two 125 horse-power boilers.

The Camp Engineering Company, 47 West Lake street, are sellers of second-hand high grade engines and motive power equipment. They report the following sales made during the past few days: Two Westinghouse compound engines, each 330 horse-power, to Madison, Wis.; one Westinghouse compound, 125 horse-power, to Harvard, Ill.; one Ball & Wood, 75 horse-power, to Michigan City, Ind.; one Beck and one Russell, each 65 horse-power, to Sault Ste. Marie, Mich.; one Buckeye, 200 horse-power, to St. Paul; one Buckeye, 150 horse-power, to Sterling, Ill.; one Atlas, 50 horse-power, to Crown Point, Ind. Two of these were second orders from the same parties. The engines enumerated will be seen to cover quite a number of high-speed automatic types. The demand for these engines keeps up with the supply.

The Chicago House Wrecking Company, West Thirteenth and Iron streets, report a continuance of the heavy demand for all kinds of second-hand machinery to which reference was made in this report for August. A particularly strong demand is observed to come from contractors who are ordering a great quantity of apparatus, especially hoisting machinery. The company state that they have found such a heavy trade in their machine tools that they have been obliged to add new

tools to their stock of second-hand machines to be able to keep up with orders.

A. L. Dawson & Co., 29 West Washington street, dealers in second-hand machinery, say that September with them was a phenomenally good month, especially for engines and boilers. The business then transacted was the best in a period of 18 months.

### A New Bar Mill Started.

PITTSBURGH, PA., October 9, 1901.—(By Telegraph.)—The new 10-inch merchant bar mill under erection for a year and a half by the Carnegie Steel Company at the Duquesne Steel Works is completed and has been started up. There is also a 13-inch mill being built, which will be started during the latter part of November. These mills were built by the Morgan Engineering Company of Worcester, Mass., and are claimed to be the most complete bar mills in the country.

**The Riter-Conley Mfg. Company.**—PITTSBURGH, PA., October 9, 1901.—(By Telegraph.)—The Riter-Conley Mfg. Company, builders of heavy plate and structural iron work, have bought a site of 63 acres at Leetsdale, on the Pittsburgh, Fort Wayne & Chicago Railroad, about 15 miles from Pittsburgh, at a cost of \$800 an acre. It is probable that the site will be used at some future time for a new works for the Riter-Conley Mfg. Company, and when this is done the present works of this concern, on Water street, Pittsburgh, and Preble avenue, Allegheny, will be abandoned. However, no plans have yet been drawn for a new works, and it is probable that it will be some little time before the new site is utilized for this purpose.

R. Shewan of Shewan, Tomes & Co., of 16 Beaver street, New York, is the president of the Hong Kong & Whampoa Dock Company, Limited, of Hong Kong. There is a report going the rounds to the effect that this company propose adding extensively to their docks and will shortly buy American equipment and machinery to the extent of \$200,000.

An establishment for the sale of second-hand machinery has been opened at 243 New Jersey Railroad avenue, Newark, N. J., by the Newark Second-Hand Machinery Company, A. P. Morris, manager of the concern, was formerly manager of the Newark Jewelry Company.

Charles E. Dustin, who for some time served in the capacity of president and general manager of Rossiter, MacGovern & Co., has terminated his connection with that firm and has organized the Charles E. Dustin Company, with offices at 11 Broadway, New York. The new company propose to engage in the purchase and sale of all kinds of electrical machinery, engines, boilers, &c., and also to undertake the construction of electric and steam plants and to do general engineering. W. S. Barstow, formerly general manager of the Brooklyn Edison Electric Illuminating Company, has been retained as consulting engineer. The company will have a capital of \$250,000.

Charles Churchill & Co., Limited, of London, have just placed an order with the Armstrong Brothers Tool Company of Chicago for 66 gang planer tools. This type of tool is the latest addition to the extensive line of tool holders built by the Chicago company.

We are informed that J. I. Lyle, who for the last five years has been connected with the home office of the Buffalo Forge Company, has just assumed charge of the New York offices of the company located at 39-41 Cortlandt street.

A plant of Davis Colby ore roasting kilns has been completed at the works of the Burden Iron Company, Troy, N. Y. The blast furnace of the plant is expected to blow in next month.

## An Increase in Pig Iron Production.

Largely because of the starting of a few important furnace plants in the Central West—some of them idle through the strike—there has been a moderate increase in the production of pig iron. Furnace stocks, however, scored a further decline, so that statistically the situation remains very sound.

The weekly capacity of the furnaces in blast on October 1 compares as follows with that of the preceding periods:

	Furnaces in blast.	Capacity per week. Gross tons.
October 1, 1901.	246	307,982
September 1.	255	299,861
August 1.	257	303,847
July 1.	249	310,950
June 1.	252	314,505
May 1.	256	301,125
April 1.	250	296,676
March 1.	248	292,899
February 1.	245	278,258
January 1.	233	250,351
December 1, 1900.	211	228,846
November 1.	201	215,304
October 1.	213	223,169
September 1.	228	231,778
August 1.	240	244,426
July 1.	284	281,413
June 1.	293	296,378
May 1.	292	295,850
April 1.	291	286,482
March 1.	293	292,643
February 1.	296	298,014
January 1.	290	294,186
December 1, 1899.	283	296,359
November 1.	277	288,522
October 1.	265	278,650
September 1.	257	267,335
August 1.	244	267,672
July 1.	237	263,363
June 1.	220	251,062
May 1.	217	250,065
April 1.	205	245,746
March 1.	192	228,195
February 1.	195	227,689
January 1.	200	243,516

The condition of the charcoal furnaces at the beginning of the month was as follows:

Charcoal Furnaces in Blast October 1, 1901.

Location of furnaces.	Total No. of stacks.	No. in blast.	Capacity per week.	No. out of blast.	Capacity per week.
New England.	7	10	185	5	220
New York.	3	1	702	2	230
Pennsylvania.	13	2	76	11	470
Maryland.	4	0	0	4	448
Virginia.	3	2	74	1	65
Ohio.	8	4	264	4	323
Kentucky.	3	0	0	3	200
Tennessee.	4	2	275	2	280
Georgia.	4	2	658	2	830
Alabama.	4	3	1,006	1	329
Michigan, Missouri and Wisconsin.	11	7	4,206	4	1,019
Texas.	4	0	0	4	872
Totals.	68	25	7,444	43	4,801

As compared with previous months the record of active charcoal furnaces stands as follows:

	Furnaces in blast.	Capacity per week.
October 1, 1901.	25	7,444
September 1.	32	6,606
August 1.	22	6,578
July 1.	22	7,157
June 1.	22	7,514
May 1.	23	7,310
April 1.	25	7,910
March 1.	26	8,074
February 1.	31	8,825
January 1.	32	7,097
December 1, 1900.	32	6,779
November 1.	30	7,923
October 1.	31	8,243
September 1.	31	8,227
August 1.	31	8,295
July 1.	32	8,492
June 1.	27	7,605
May 1.	35	6,894
April 1.	29	7,838
March 1.	29	7,047
February 1.	32	8,004
January 1.	30	7,457
December 1, 1899.	30	7,511
November 1.	29	7,118
October 1.	25	6,928

The condition of the coke and anthracite furnaces at the beginning of the month was as follows:

Coke and Anthracite Furnaces in Blast October 1, 1901.

Location of furnaces.	Total No. of stacks.	No. in blast.	Capacity per week.	No. out of blast.	Capacity per week.
New York.	14	4	4,951	10	4,357
New Jersey.	7	4	5,239	3	1,350
Spiegel.	3	3	495	0	0
Pennsylvania:					
Lehigh Valley.	26	14	7,835	12	5,584
Spiegel.	1	1	125	0	0
Schuylkill Valley.	14	10	7,786	4	1,840
Upper Susquehanna.	2	1	1,044	1	836
Lower Susquehanna.	8	6	5,463	2	931
Spiegel.	1	1	313	0	0
Lebanon Valley.	12	1	8,281	1	518
Pittsburgh District.	31	30	72,551	1	1,925
Spiegel.	1	1	2,486	0	0
Shenango Valley.	16	14	9,568	2	2,794
Western Pennsylvania.	21	18	16,167	8	4,311
Spiegel.	1	1	1,089	0	0
Maryland.	5	4	5,815	1	1,200
Wheeling District.	9	8	9,005	1	1,872
Ohio:					
Mahoning Valley.	15	13	26,317	2	2,867
Central and Northern.	14	13	23,780	1	1,400
Hocking Valley.	2	0	0	2	835
Hanging Rock.	12	9	5,319	3	750
Illinois.	16	16	32,599	0	0
Spiegel.	1	1	1,071	0	0
Minnesota.	1	0	0	1	263
Wisconsin.	4	3	8,587	1	574
Missouri.	1	0	0	1	570
Colorado.	2	1	9,300	1	3,000
Spiegel.	1	1	400	0	0
The South:					
Virginia.	20	14	9,204	6	2,990
Kentucky.	5	4	1,685	1	685
Alabama.	36	22	20,975	14	9,392
Tennessee.	16	8	5,258	8	3,962
Georgia.	1	0	0	1	450
North Carolina.	1	0	0	1	437
Totals.	820	221	300,588	89	54,828

In comparison with previous months the record of the coke and anthracite furnaces stands as follows in gross tons:

	Number in blast.	Capacity per week.
October 1, 1901.	221	300,538
September 1.	233	293,456
August 1.	235	297,369
July 1.	237	303,793
June 1.	232	306,991
May 1.	233	296,915
April 1.	225	298,766
March 1.	222	294,825
February 1.	214	278,258
January 1.	201	243,254
December 1, 1900.	179	222,067
November 1.	171	207,381
October 1.	182	214,021
September 1.	197	223,551
August 1.	209	226,131
July 1.	252	274,921
June 1.	266	288,771
May 1.	267	286,956
April 1.	262	281,644
March 1.	264	285,596
February 1.	264	290,010
January 1.	250	286,729
December 1, 1899.	253	289,448
November 1.	248	281,409
October 1.	241	272,428

During September work was resumed by one Lock Ridge, of the Thomas Iron Company, one of the National Steel Company's furnaces at New Castle, Pa., and by the new stack of the Sharon Steel Company; by Everett in Western Pennsylvania, one Ashland in Kentucky, one Bellaire, and one Mingo in the Wheeling district; by one Etna in the Hanging Rock region, and Mattie in the Mahoning Valley. There were blown out one Sheridan in the Lebanon Valley, Big Stone Gap and Princess in Virginia, Bessie in the Hocking Valley, Grace in the Mahoning Valley, and one Clifton, Clitico and Goodrich in Alabama and Tennessee.

### Furnace Stocks.

The position of furnace stocks, sold and unsold, as reported to us, was as below on October 1, the same furnaces being represented as in former months. This does not include the holdings of the steel works producing their own iron:

Stocks.	May 1.	June 1.	July 1.	Aug. 1.	Sept. 1.	Oct. 1.
Anthracite and Coke.	363,251	329,518	327,761	328,787	318,069	299,824
Charcoal.	75,087	78,010	64,837	58,542	62,005	61,769
Totals . . .	438,388	407,728	392,598	387,329	380,074	361,793

## CORRESPONDENCE.

### **The Test of Fire Proof Building Materials.**

To the Editor: In your report of the tests of fire proof building materials on pages 13 and 14 of your issue of September 12, what you say in regard to the test of the Metropolitan Company calls for a few words of explanation. In the tests noted the Metropolitan Company's building represented two different styles of patented partition; one, a partition which we have advertised and used, and which stood the test as well as any, although the recorded temperature was over 2000 degrees, which was considerably greater than that obtained in the other buildings; and the other, a thinner partition, constructed in an entirely different manner, a portion of which came down under the water pressure after the fire.

METROPOLITAN FIRE PROOFING COMPANY,

By EDMUND KETCHUM, Secretary.

NEW YORK, October 8, 1901.

### **The Largest Press.**

To the Editor: We have before us a copy of *The Iron Age*, calling our attention to what is claimed to be the largest sheet metal drawing press in America. We wish to state that we have built and shipped to various parties in the United States a number of drawing presses considerably larger than the one to which attention has been called. These presses weigh 125,000 pounds and will draw sheet metal articles from the smallest up to pans, sinks, &c., of 48 x 24 inches. We have also built machines much larger than these, weighing something over 150,000 pounds, but they have been for people in Europe.

E. W. BLISS COMPANY.

NEW YORK, N. Y., October 7, 1901.

## PERSONAL.

Charles E. Hulick has been appointed superintendent of the Thomas Iron Company's furnaces, at Island Park, Pa.

Fred K. Bennett has resigned as superintendent of the rail mill at the Ohio Works, Youngstown, and has returned to the Maryland Steel Company, at Baltimore. He is succeeded by John Gardner.

Alfred C. Lary has been appointed superintendent of the Hardy Machine Company, Biddeford, Maine, in place of Charles C. Worth, resigned.

Abram S. Hewitt has been presented by the New York Chamber of Commerce with a gold medal in recognition of his services in the cause of rapid transit for New York City.

John Howell has resigned his position as assistant master mechanic at the Lower Union Mills of the American Steel Hoop Company, at Youngstown, Ohio. He has entered the employ of the Youngstown Iron Sheet & Tube Company in a similar capacity.

George W. Hannan, formerly superintendent of La Belle Works of the American Tin Plate Company, at Wheeling, W. Va., has resigned, and has been appointed superintendent of the new tin mills being erected by the Pope Tin Plate Company, at Steubenville, Ohio.

Charles M. Schwab, president of the United States Steel Corporation, is to be in Braddock this week, and will probably make definite arrangements as to the nature of the gift he promised to make to that town some time ago. By many it is believed Mr. Schwab will build an industrial school at Braddock, to be modeled much on the same lines as the very successful one which he has maintained at Homestead for some years.

A. B. Carter has resigned as district manager for the National Steel Company, at Bellaire, Ohio, and has been succeeded by N. M. Peterson of Columbus, Ohio.

Leon M. Loeb, general manager of the Sanitary Standard Mfg. Company for the United Kingdom, arrived in Pittsburgh last week for the purpose of making an inspection of the plants of his concern located in that city and vicinity. Mr. Loeb states that the demand in

England for sanitary goods made in Pittsburgh is steadily growing, and will continue to expand.

W. J. Alford of Anderson, Ind., has been elected vice-president and manager of the Indiana plants of the Ames Shovel & Tool Company.

W. B. Clarkson, manager of the Champion Machine Company of Des Moines, Iowa, has been appointed general agent for the Fuller & Johnson Company in Des Moines.

Among the recent arrivals in this country is George G. Blackwell of the firm of Geo. G. Blackwell, Sons & Co., Limited, Liverpool, manufacturers of rare alloys and merchants in refractories, furnace lining and minerals.

D. Adamson of Joseph Adamson & Co., manufacturers of boilers and electrical traveling cranes, at Hyde, Cheshire, is making a brief visit to this country.

William B. Schiller, first vice-president of National Tube Company, of Pittsburgh, has returned from Europe.

John Jarrett has returned from England, where he has collected data relating to labor and wages in the iron industry.

At Pittsburgh the courts have made an order ratifying the return of the sale of St. Paul's Cathedral to Henry C. Frick for \$1,325,000, of which \$1,000,000 is a mortgage bearing 4 per cent.

The well-known metallurgist, J. H. Darby, of the Brymbo Works, Wrexham, England, is now on this side of the Atlantic.

### **The Efficiency of Fans.**

Some weeks ago, states the London *Engineer*, we reported on the performance of a Davidson fan, employed in the much needed work of ventilation at the Law Courts. The publication of the article in question was followed by the receipt of a somewhat voluminous correspondence. As one writer has pertinently pointed out, this is the third or fourth discussion concerning the merits and demerits of fans that has appeared in our pages. These appear to be invariably barren of results; and the object of this article is to set forth why, in our opinion, these discussions arise, and why, in the main, they lead to nothing. To us the explanation appears very simple. People dispute about fan efficiency without having arrived at any uniform standard by which to measure it. If each of our correspondents used a rule of a different length to settle the diameter, width and dimensions in general of a fan they would naturally arrive at different conclusions. The efficiency of fans is measured by different standards of comparison, and the result is, in its way, just as misleading as would be the use of rules as we have indicated which did not agree as to the length of an inch and a foot. So far as we are aware, there is nothing new in all this; it has always been so within our experience. Mathematicians have dealt very fully with the theory of fans; but neither the maker nor the purchaser cares in the least for what the mathematician has to say, and this simply because the rules of construction laid down by the mathematician cannot be applied in practice, or, being applied, do not produce the results foretold. Air has, indeed, an unfortunate predilection for doing that which was not anticipated; and there is excellent reason to believe that the best proportions for fans of all kinds have been ascertained by a tedious process of trial and error, and are the embodiment of pure empiricism rather than the result of mathematical deduction. In a word, mathematics will not help us at all in arriving at a decision on the merits and demerits of any particular type of fan. Nothing, in short, will take the place of actual results obtained in practice. That is to say, it is useless to assert that a fan is theoretically wrong, while the maker has more orders on his books for it than he can satisfy; or that a fan is theoretically right, while it is being discarded after trial by various users.

In trying to arrive at some standard of efficiency, it is, perhaps, well to reject the mode of estimation which

goes no further than an expression of satisfaction with a result. A certain colliery, for example, is supplied with a new fan. The result is excellent ventilation. Every one is pleased. The fan was supplied to move a given number of cubic feet of air in an hour, and it does this and a good deal more. Nothing, however, is said about the cost in power. Our correspondents are not, and very properly are not, content with such definitions of efficiency as this. The main point, though not the only point, at issue appears to be the horse-power required to perform a given amount of work. So far they agree. But the moment an attempt is made to measure or define the work, issue is joined. Far be it from us to side with any one of several parties to this dispute. Our purpose is to direct attention to facts which are overlooked by our correspondents. Thus, one standard is the number of cubic feet of air moved at a given velocity per unit of time. Apparently this is very simple. We have a pound or a ton of air moving at a given speed. It has acquired that speed from the fan. The energy or *vis viva* stored in the moving air represents so much work done in a unit of time. This is easily reduced to terms of horse-power. The engine driving the fan is indicated. A rule of three sum gives us the percentage of the whole power exerted in moving the air, and, consequently, the efficiency of the fan. All this seems plain enough, but it is quite misleading, or, at all events, the method may lead to endless discussion. At the very outset we are met by the question, What is the velocity of the air? or, to be more precise, of its many velocities which are we to select? Any figures will do to illustrate our meaning. A given fan is delivering air with a velocity measured at the throat of an *evasée* chimney of 50 feet per second. The stored work in every pound

$$\frac{50 \times 50}{64.4} = 38.3 \text{ foot-pounds. So far so well.}$$

But now, instead of measuring the velocity at the throat of the chimney, let us measure it at the mouth, where the sectional area is double that at the throat. Here the air is moving at 25 feet per second, and the stored energy in each pound of air is only 9.575 foot-pounds per pound, or one-fourth of the former quantity. What has become of the difference? Nothing is more easy than to say that it has disappeared in effecting the expansion of the air. Inasmuch, however, as the air is, according to all authorities, more dense at the mouth of the chimney than it is at the throat, this explanation is, to say the least, open to objections. Be the dissipation of energy due to what cause soever we think good to assign it, the fact still remains that no one has ever actually measured the forces causing the waste, nor, indeed, does it seem to be possible to measure them. If what we have written has been understood, it will be seen that to estimate the efficiency of a fan by the velocity of the air in a tube may introduce gigantic errors. Aware of this, some persons would take the velocity of the air at the tips of the fan blades. We do not hesitate to say that it is impossible to ascertain the velocity of air at this point all around the fan with accuracy. Others take the velocity in a given drift or air way in a mine. But it will readily be understood, we think, that this method may be thoroughly misleading. The fact on which we wish to insist is that any error introduced by mistaking the velocity of the air, or by measuring that velocity in the wrong place, varies in amount, not as the velocity, but as the square of the velocity. To make this yet clearer, it may perhaps suffice to say that if a given velocity represents 100 indicated horse-power, one-half that velocity represents but 25 indicated horse-power, and so on. But there is another factor to be considered, to which sufficient importance is not, as a rule, attached. Fans have not only to deliver air, but they have to inhale it, and not infrequently this has to be done through tortuous passages, involving the formation of eddies, and other absorbers of energy. It is almost impossible to estimate the work which may be lost in this way, the general result being a reduction in the volume or weight of air delivered.

Considerations of this kind establish a doubt as to whether the proper measure of fan efficiency is the weight of air moved per minute and its velocity. Not

that the standard is in itself wrong, but that it is extremely difficult to apply it fairly when a comparison is being drawn between two fans. A given fan may be discarded, and first one fan, which we shall call A, and then another, which we shall call B, is tried. The first doubles the weight of air delivered per minute, the velocity of the air remaining the same, an effect easily produced, say, merely by enlarging various dimensions. The fan B also doubles the quantity of air delivered, but it does so by doubling the velocity of the air. The power required to work A will be double, let us say, that used by the discarded fan, while that used by B will actually be eight times as much. How misleading velocity may be is very clearly seen, we think, from this example. Furthermore, it must not be forgotten that to estimate the efficiency of a fan in terms of velocity of the air moved and its weight is a somewhat recondite method of going to work. Indicator cards cannot tell us anything of the power stored in the moving air. Probably the most satisfactory method of arriving at a just appreciation of the value of two types of fan is simply to take the actual volume of air transferred from one place to another per minute, without regard to its velocity, and then to ascertain the torque or angular resistance of the fan. It is clear that a fan can do work without any transfer of air whatever, and that the air even in a closed fan case will offer more or less resistance to the rotation of the blades. After all, the true measure of the work done is the resistance which the air offers to the rotation of the fan blades. It is in overcoming this resistance that power is expended. That energy is stored up in the air is purely an incident—an accidental and inconvenient concatenation of cause and effect in which no one is interested, since all the stored energy in the air is wasted. A fan is not used to accumulate energy in air, but only to move air from one place to another. The work done by a locomotive is not determined in terms of the momentum of the train, but of the speed and the load on the draw bar. This brings us down to the exceedingly simple statement that, other things being equal, that fan is the best which moves a given volume of air per minute, out of, say, a coal mine or a building, with the lowest average pressure on the piston. We need not, we think, stop to explain that if the torque of the fan pulley and the belt speed in feet per minute are known, nothing is easier than to determine the precise horse-power expended by the fan. The measurement with accuracy of the volume of air moved is much more difficult; but we venture to think that it is not beyond the resources of science.

**Warwick Furnace Started.**—The new blast furnace of the Warwick Iron & Steel Company of Pottstown, Pa., was lighted on the morning of the 8th inst., everything progressing favorably. Edgar S. Cook is president and general manager of the company, and G. W. Nicolls secretary and treasurer.

**Information Wanted.**—A correspondent wishes to know where he can obtain a degerminator—i.e., a machine which breaks or cuts up the grains of maize and separates the germ from the hominy.

George W. Boyd of Pittsburgh has been elected president of the International Association of Bridge and Structural Iron Workers. Changes have been going on in this organization for several years and a large number of members recently deserted it. A demand has been made by this organization on the Penn Bridge Company, Beaver Falls, Pa., that it be recognized.

It is claimed that the McKeesport Mfg. Company, recently organized at McKeesport, Pa., will build a sheet mill, to be located somewhere along the Monongahela River, in the Pittsburgh district.

The Union Iron & Steel Company, 71 Broadway, New York City, have booked an order from the Ashland Steel Company, Ashland, Ky., for 25,000 tons of Bessemer pig iron, to be manufactured at the Union Furnace, Ironton, Ohio.

# HARDWARE.

## CLASSIFIED LISTS OF HARDWARE MERCHANTS.

THE question as to the grading of prices to the various classes of trade has always been a difficult one for manufacturers to determine. Whatever general principle may be adopted, there are sure to be inconveniences in carrying it out which lead to the making of exceptions which tend to break down the rule. This subject naturally commands the attention of manufacturers whenever a combination or consolidation is effected, as it is then necessary to adopt a distinct and definite policy and to carry it out consistently.

The manner in which this question has been decided by the multitude of consolidations and combinations of the past few years is significant. With signal unanimity they have adopted a policy in the grading of their prices which recognizes the jobber more thoroughly and completely than ever before. This has been done by not only establishing a wide differential between the jobber and the retailer, but by making a list of houses who are to be ranked as jobbers and to whom alone jobbers' prices can properly be given. The position of the jobber has thus been materially strengthened, and an opportunity given him to take care of a class of business which had previously gone direct to the manufacturers.

It is not surprising that this policy was adopted by these strong associations of manufacturers. Most of them had recognized the wisdom of making a reasonable differential between jobbers and retailers, and many of them preferred to deal principally with the large merchants. To have adopted a different policy would, moreover, have alienated the wholesale trade and put an immediate and troublesome obstacle in the way of maintaining the high prices which had been established. The jobbers, too, were prompt in making earnest and emphatic appeal to the associated manufacturers for ample protection, and as no voice of opposition was heard from those whose interests were more or less jeopardized by the arrangement the policy now so generally adopted went into effect.

While there are many reasons for the existing method of regulating these association prices, there are some considerations which tend to make it a difficult matter to carry out the policy, and which militate against its permanent success.

There is no doubt that the arrangement is unpopular with many of the larger and more enterprising retail houses, who have been accustomed to direct dealings with the manufacturers. Unless this class of houses manage to get on the jobbers' list they are ranked with the mass of retail merchants and called upon to pay much higher prices relatively than they have been accustomed to. Formerly they were able to buy, for example, a carload of some staple goods at figures closely approximating those paid by the jobbers, whereas they are now under this system called upon to pay a broad jobbers' profit on these goods. This has caused much dissatisfaction and not a little friction. It has led to more or less inquiry among the larger retail houses as to whether or not it is feasible for them to get on the jobbers' list, and some certainly have engaged in the jobbing business, in a very limited way, it is true, that they may have claim to such classification. Many retail merchants, too, most of whose dealings would naturally be with the jobbers, are disposed to regard the arrangement with disfavor as discriminating against them in a way to which they have not been accustomed

when the question of price was the matter of negotiation between buyer and seller. The materially higher prices established by some of these combinations have no doubt been more obnoxious than they would otherwise have been because determined, as many merchants consider it, in an unreasonable and arbitrary manner without regard for the interests of the smaller houses. This feeling, which has something to do with the opposition of merchants to combinations or so-called trusts, is an actual force in trade with which combinations have to reckon.

The system has, however, a more important bearing when the matter of outside competition is considered. Manufacturers entering the field, where such grading of the trade is carried out, find it a comparatively easy thing to secure orders from the better class of retail merchants and the smaller jobbers who are not classified to their liking or are not on the jobbers' list at all. The strict line of demarcation between the different classes of trade thus presents an excellent opportunity for the introduction of new goods, especially as the feeling entertained by the trade at large against combinations leads many merchants to give the preference to the products of manufacturers who are not thus associated. In this way the method which was perhaps at first adopted largely because it seemed the simplest and easiest course to follow, gives direct encouragement to new manufacturers who may be desirous of entering the market.

## Condition of Trade.

There are many indications of the steady movement of business in all parts of the country. The consumption of manufactured products is large, as shown in the excellent trade which the retailers are doing and the activity which prevails in manufacturing establishments. In many lines there is difficulty in obtaining raw material, as the market feels the effect not merely of the steel strike, which caused the stoppage of production for a time, but also in the steady demand made upon the mills by the large business which is doing. In this connection the papers presented at the meeting of the National Hardware Association in regard to the existing trade conditions and the permanence of the prosperity which is being enjoyed will be of special interest. Among the Hardware trade the volume of new business coming in to the manufacturers from the merchants is not especially heavy, but is of a character to indicate an excellent state of things in the trade. The demand from the Implement makers and railroads is very large, and manufacturers supplying goods of this class are, as a rule, exceptionally busy, and in many cases seriously behind their orders. In general Shelf Hardware, too, the demand is good, and many manufacturers are unable to supply goods as promptly as called for. In Mechanics' Tools, and in Builders' Hardware the makers are pushed with orders, some of them referring to the existing trade as larger in volume than they have had for years. The amount of building throughout the country is, in fact, one of the indications of the general well being of the people. The character of buildings seems to cover a wide range from large structures in which much iron is used to smaller and less pretentious and less expensive buildings which are going up throughout the country. Prices, as a rule, are quite steady, and in some cases strong. Only a few exceptional lines are regarded as weak. With the satisfactory conditions existing, the excellent crops which have been harvested, the amount of foreign trade which

is doing, the trade enters on this last quarter of the year with a promising outlook.

### Chicago.

(By Telegraph.)

Shelf Hardware jobbers report a heavy trade, but the volume of business is hardly up to the high mark reached in August and September. A great deal of business is now being done in filling orders taken long since, but new business is not quite so active. Jobbers, however, are not concerned over the slight falling off, as they are confident that an improvement will be experienced later in the season. Continued scarcity exists in Tin Plate and Black Sheets, as well as Tinware, Stamped Ware and Galvanized Ware. It is almost impossible to secure some of the seasonable articles in these lines. Enameled Ware is in a little better supply. Scarcity also exists in small goods in the Shelf Hardware line. Some of the largest factories in the country are considerably in arrears in filling orders, the managers stating that although they have increased their manufacturing facilities they find a scarcity of labor, and therefore have been unable to keep up with their orders. Jobbers of Heavy Hardware report a strong demand for practically everything in their line. They are doing a large business in Wagon Material and all kinds of Iron and Steel. The demand from distant points is still quite a notable feature. Orders have been placed the past week for shipments to New York and other Eastern points. The Carriage manufacturers are now beginning to place contracts for their season's supplies, and this demand is coming on a market which is already strained to meet the current necessities of consumers.

### St. Louis.

(By Telegraph.)

The same condition and general volume of demand prevail in the Hardware trade as last reported. Each new month seems to mark the time for making a new record of sales, and the trade are reaping very satisfactory returns. Talks with the retailer in the country districts bring out the fact that trade with him is very satisfactory, and that he is making preparations for an active holiday trade by purchasing a much more extensive line of goods than has heretofore been his practice.

## NOTES ON PRICES.

**Wire Nails.**—Wire Nails are moving in large volume and shipments are being made by mills with considerable promptness. Prices made by outside mills are being generally met, which results in concessions at competitive points. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

To jobbers in carload lots.....	\$2.30
To jobbers in less than carload lots.....	2.35
To retailers in carload lots.....	2.40
To retailers in less than carload lots.....	2.50

**New York.**—The local Wire Nail market remains in an unchanged condition. Demand continues satisfactory at former quotations, which are as follows:

To retailers, carload lots on dock.....	\$2.53
Small lots at store.....	2.60

**Chicago, by Telegraph.**—Manufacturers of Wire Nails report orders rolling in from all over the West and Southwest for lots of 1000 kegs and upward. The volume of business the past week has been even larger than for the preceding weeks. Orders are almost invariably accompanied with specifications. The expectations of manufacturers have thus been greatly exceeded. Jobbers likewise report a remarkably good demand. Prices are maintained at \$2.45 for carload lots and \$2.50 for small lots.

**St. Louis, by Telegraph.**—The demand for Wire Nails continues good, and all requirements are being promptly cared for. We quote carload lots to retailers at \$2.50 base, and less than carload lots at \$2.55 to \$2.60.

**Pittsburgh.**—The Wire Nail market is weak, and concessions in prices are being more easily obtained. For

some points of delivery cuts in prices are small, but at other points are quite heavy. The output of Wire Nails at the present time is large, but demand is heavy, and the mills are making shipments of their product about as fast as made. We quote, f.o.b. mill, terms 60 days, or 2 per cent. discount for cash in 10 days:

To jobbers in carload lots.....	\$2.30
To jobbers in less than carload lots.....	2.35
To retailers in carload lots.....	2.40
To retailers in less than carload lots.....	2.50

**Cut Nails.**—The demand for Cut Nails continues fair. There is a reported unevenness in prices at some points where competition is most keen. Quotations are as follows, f.o.b. Pittsburgh, plus the actual freight to point of destination, terms 60 days, or 2 per cent. off in 10 days:

Carload lots .....	\$2.05
Less than carload lots.....	\$2.10 to 2.15

**New York.**—The demand for Cut Nails in the local market continues in about former proportions. New York quotations for carload and less than carload lots are as follows:

Carload lots on dock.....	\$2.18
Less than carload lots on dock.....	2.23
From store.....	\$2.18 to 2.30

**Chicago, by Telegraph.**—Jobbers are enjoying a well sustained demand for Cut Nails. Small lots are held at \$2.35.

**St. Louis, by Telegraph.**—The demand in the Cut Nail market continues along the same lines and is considered fair. No change is to be noted in prices. Small lots from store are quoted from \$2.30 to \$2.35.

**Pittsburgh.**—There is a fair demand for Cut Nails, but the tone of the market is weak. Concessions in prices are being made on Cut Nails, especially at competitive points. We quote for domestic trade, f.o.b. Pittsburgh, plus Tube freight to point of destination, terms 60 days, or 2 per cent. off in 10 days:

Carload lots.....	\$2.05
Less than carload lots.....	2.10

**Barb Wire.**—The distribution of Barb Wire continues heavy in the West and Southwest. In the East requirements are moderate. Irregularity in prices is reported at competitive points. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

To jobbers in carload lots, Painted.....	\$2.60
To jobbers in carload lots, Galvanized.....	2.90
To jobbers in less than carload lots, Painted.....	2.65
To jobbers in less than carload lots, Galvanized.....	2.95
To retailers in carload lots, Painted.....	2.70
To retailers in carload lots, Galvanized.....	3.00
To retailers in less than carload lots, Painted.....	2.80
To retailers in less than carload lots, Galvanized.....	3.10

**Chicago, by Telegraph.**—Orders for Barb Wire are accompanying the orders for Wire Nails, and are in correspondingly large volume. Heavy orders are being received for shipment to all parts of the West and Southwest, including sections supposed to be suffering from the summer drought. Jobbers report a very good run of business, which with them is not quite so heavy as the demand for Wire Nails. Carload lots are quoted at \$2.75 for Painted and \$3.05 for Galvanized. Less than carloads are quoted \$2.85 and \$3.15 respectively, with these prices firmly held.

**St. Louis, by Telegraph.**—No new features have developed in the market for Barb Wire, the same favorable conditions still ruling. Jobbers quote carload lots of Painted at \$2.85 and Galvanized at \$3.15; less than carload lots at \$2.95 for Painted, \$3.25 for Galvanized.

**Pittsburgh.**—There is a good demand for nearly all sections of the country, but at certain competitive points concessions in prices are being made. A good deal of Wire is going abroad. For domestic trade we quote: Galvanized Barb Wire, \$2.90 in carload lots to jobbers, and Painted, \$2.60. Terms, 60 days net, 2 per cent. discount for cash in 10 days, f.o.b. Pittsburgh.

**Plain Wire.**—Active demand is a prominent feature in the Plain Wire market, and mills are behind on orders. At points where competition is strong, prices are reported as uneven. Quotations are as follows, f.o.b.

Pittsburgh, terms 60 days, or 2 per cent. off for cash in 10 days:

Base sizes.	Plain.	Galv.
To jobbers in carload lots.....	\$2.25	\$2.65
To jobbers in less than carload lots.....	2.30	2.70
To retailers in carload lots.....	2.35	2.75
To retailers in less than carload lots.....	2.45	2.85
The above prices are for the base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:		
6 to 9.....Base.....	\$0.40 extra.	
10.....\$0.05 advance over base.....	.40	"
11......10	"	"
12 and 12½......15	"	"
13......25	"	"
14......35	"	"
15......45	"	"
16......55	"	"
17......70	"	"
18......85	"	"

For even weight bundles, 50 pounds and over, 5 cents per bundle advance on above.

**Chicago, by Telegraph.**—The situation is unchanged, conditions being the same as those reported during preceding weeks. Manufacturers are enjoying a large demand, and are still considerably in arrears on shipments. Carload lots of Wire are held at \$2.40 and small lots from stock at \$2.50.

**Pittsburgh.**—Demand continues heavy, and the mills have not yet caught up with back orders. There is some unevenness in prices of Plain Wire at points of delivery where competition is keen. For domestic trade we quote:

To jobbers in carload lots.....	\$2.25
To jobbers in less than carload lots.....	2.30
To retailers in carload lots.....	2.35
To retailers in less than carload lots.....	2.45
Galvanized Wire up to No. 14 is 40 cents advance on Plain; Nos. 15 and 16, 75 cents advance, and Nos. 17 and 18, \$1 advance. Terms are 60 days net, with 2 per cent. off for cash in 10 days, f.o.b. Pittsburgh.	

**Pumps.**—The relations between the manufacturers of Pumps are referred as much more harmonious than usual, although there is no formal agreement in regard to prices which includes all of them. Prices, however, are pretty regularly maintained, with an excellent volume of business.

**Heavy Hammers.**—This is a line in which the market for some time has been characterized by a strong tone, largely on account of the difficulty in obtaining the raw material. An advance of about 10 per cent. has recently been made, and it is understood that the manufacturers are adhering quite firmly to the new price.

**Oilers.**—Several advances have recently been made in Oilers, and the market is in an excellent condition, the advanced prices being quite firmly adhered to. A good many of the jobbers, however, have some goods on hand purchased at former prices, and there is some slight irregularity on this account.

**Wrought Iron Pipe.**—There continues to be an active demand for Wrought Iron Pipe, and the leading manufacturers are still seriously behind their orders, though they are now turning out goods quite rapidly. Parties who have stocks of Pipe on hand are still able to realize a good advance beyond the manufacturers' quotations, but in view of the improved supply such exceptional prices are somewhat lower than they were a few weeks ago.

**Scythes.**—The agreement between the manufacturers of Scythes establishing the new prices, referred to in a recent issue, has been of short duration, as the market is now reported an open one, with materially lower prices current. The presence of outside competition is understood to be the reason for the break in prices.

**Registers.**—The market for Registers, Ventilators, &c., is not in an entirely even condition. This is partly caused by the fact that the old list is still in use and, to a certain extent, principally by the jobbers, but it is understood also that some of the manufacturers are still adhering to it. Other manufacturers have made slight

advances, their quotations being based on the new list. There is not, however, entire uniformity in the discounts named by the different manufacturers, but there is a disposition to obtain better prices in view of the low figures at which the goods for some time have been selling.

**Eave Trough and Conductor Pipe.**—The trade in these commodities continues good, but there are no special features except a large demand for the goods, the prices of May, 1901, still being maintained without any disposition to shade them on the part of manufacturers.

**Cordage.**—Manufacturers have generally advanced the price of Manila Rope, on the basis of 7-16 inch and larger, to 11½ cents per pound, with ¼ cent rebate to largest purchasers. Some manufacturers have advanced Sisal Rope, on the same basis, to 9½ cents, with ¼ cent rebate to largest buyers. Others, however, are quoting 8½ cents, with ¼ cent rebate, as above. Demand is fair, but for immediate requirements. Jute Rope is being ordered by the trade, to some extent, as a substitute for Sisal Rope.

**Glass.**—The general situation in the Glass market remains unchanged. The demand has improved somewhat, and it is expected that by November 1, when the combined factories go into blast, stocks will be materially reduced. A capacity equivalent to about 300 pots is now in operation, and will be increased when co-operative factories start up on October 15. Jobbers' quotations are as follows:

	Discount.
Less than car lots, from store.....	80 and 20 %
Carloads, f.o.b. factory.....	85 and 5 %

**Paints and Colors.**—**Leads.**—White Lead in Oil continues in good demand. Prices are referred to as being unsatisfactory at points where competition is sharp, as concessions are made to obtain desirable orders. No change has been made in quotations, which are as follows: In lots of 500 pounds or over, 6½ cents; in lots of less than 500 pounds, 7 cents per pound.

**Oils.**—**Linseed Oil.**—Scarcity of Oil is the principal feature in the Linseed Oil market. Crushers have not been able to make prompt deliveries on contracts, but are giving their customers some Oil to keep them going. It is not considered probable that much relief can be expected during the next week or two. The demand for spot Oil is good and the market firm at the following quotations, which are according to quantity:

	Per gallon.
City Raw Oil.....	.65 to .66c.
Out of town Raw Oil.....	.65 to .66c.
Boiled Oil, 2 cents per gallon advance on Raw.	

**Spirits Turpentine.**—The slowness with which Turpentine is coming into the Savannah market makes the offerings at this point light, and advances in price have resulted. Higher values have checked business and sales are confined to small lots. Quotations, according to quantity, are as follows: Southerns, 37½ to 38 cents; machine made barrels, 38 to 38½ cents per gallon.

## EIGHTH ANNUAL SPORTSMEN'S SHOW.

THE eighth annual Sportsmen's Show, held under the auspices of the National Sportsmen's Association, will open Wednesday, March 5, 1902, at Madison Square Garden, New York, and continue until Wednesday, March 19. Notwithstanding the progressive improvements in the shows that have so far been held, it is the intention of the management to surpass any which have been given. The trade exhibits will occupy space in the gallery, the main floor being reserved for exhibits of sportsmen's camps, guides, woodsmen and trappers, live game animals, game birds and game fishes, log cabins and other features of life in the woods. There will be Fly Casting, Rifle and Revolver competitions, exhibits of Boats, Launches, Canoes and Marine Motors, Taxidermy, Sportsmen's Supplies, Golf Goods, Cameras, Tents, Cabins and Portable Houses, Ammunition and various other features of a similar character. Intending exhibitors desiring particulars as to space and general arrangements should address J. A. H. Dressel, general manager, Post Office Box 1353, New York.

# National Hardware Association.

## ENTERTAINMENT BY THE CHICAGO HARDWARE AND MANUFACTURERS' CLUB.

The Hardware and Manufacturers' Club of Chicago royally entertained the jobbers who passed through that city on Tuesday *en route* to Cleveland. The entertainment consisted of a tally-ho drive in the afternoon, which extended over the boulevards and through the parks, and a banquet at the Technical Club in the evening.

The Executive Committee having general supervision of the arrangements consisted of W. H. Bennett of the Reading Hardware Company, H. H. Roberts of *The Iron Age* and S. S. Gould of the St. Louis Shovel Company. The special committee in charge of the tally-ho drive were Richard Gedney of the Yale & Towne Mfg. Company, Frank Baackes of the American Steel & Wire Company and H. A. Taylor of the American Screw Company.

Another special committee, having the banquet in charge, were H. H. Roberts, J. D. Warren of the J. D.



Warren Mfg. Company and P. W. Holmes of the Lalance & Grosjean Mfg. Company.

Badges were provided for all in attendance, consisting of a celluloid pin bearing the monogram of the club with ribbons attached, a white ribbon designating the guests, red the Reception Committee, and blue the Executive Committee.

The following jobbers comprised the guests, many of them being accompanied by their wives:

B. Fred. Tritch, Geo. A. Bushnell, Geo. Tritch Hardware Company, Denver, Col.  
Geo. W. Trout, Geo. W. Trout & Co., Chicago, Ill.  
Chas. D. Clark, Clark, Quisen & Morse, Peoria, Ill.  
Rudolph Tenk, Tenk Hardware Company, Quincy, Ill.  
A. D. Baker, Baker Hardware Company, Sioux City, Ia.  
Fred. Empkie, Empkie, Shugart Company, Council Bluffs, Ia.  
W. H. Kalbach, Huber & Kalbach Company, Oskaloosa, Ia.  
Col. J. R. Nutting, Sickels, Preston & Nutting, Davenport, Ia.  
H. E. Tredway, A. Tredway & Sons Hardware Company, Dubuque, Ia.  
S. H. Jones, Drake Hardware Company, Burlington, Ia.  
Chas. F. Schmidt, Chas. F. Schmidt Hardware Company, Burlington, Ia.  
W. H. Harwi, A. J. Harwi Hardware Company, Atchison, Kan.  
T. G. Walther, C. W. Hackett Hardware Company, St. Paul, Minn.  
J. A. Warner, Wyeth Hardware & Mfg. Company, St. Joseph, Mo.  
J. F. and W. B. Richards, Richards & Conover Hardware Company, Kansas City, Mo.  
Geo. E. Garland, Townley Metal Company, Kansas City, Mo.  
H. J. Lee, Lee-Glass-Andreasen Hardware Company, Omaha, Neb.  
W. S. Wright, P. C. De Vol, Rector & Wilhelmy Company, Omaha, Neb.  
R. M. Dudley, Gray & Dudley Hardware Company, Nashville, Tenn.  
C. B. Carter, secretary Southern Hardware Jobbers' Association, Knoxville, Tenn.  
Capt. W. W. Woodruff, Woodruff Hardware Company, Knoxville, Tenn.

H. G. Lipscomb, H. G. Lipscomb & Co., Nashville, Tenn.  
James Moroney, Moroney Hardware Company, Dallas, Texas.  
L. Gotfredson, Gotfredson Bros. Hardware Company, Green Bay, Wis.  
J. B. Silliman, Blish, Mize & Silliman Hardware Company, Atchison, Kan.  
I. N. Hockaday, Hockaday Hardware Company, Wichita, Kan.  
J. H. Fall, Jr., J. H. Fall & Co., Nashville, Tenn.  
E. J. Lewis, R. D. Cone Company, Winona, Minn.  
J. G. Bauer, W. A. L. Thompson Company, Topeka, Kan.

The weather being favorable, the drive was thoroughly enjoyed by everybody. The procession of coaches was filled by the jobbers and their ladies and representatives of the club. The names of the latter who were either at the banquet or participated in the drive are as follows:

Frank Baackes and D. A. Merriman, American Steel & Wire Company.  
Henry Hirsch, American Cutlery Company.  
D. W. Simpson, Wilcox Mfg. Company.  
E. M. Kemp, Wabash Screen Door Company.  
D. B. Woodbury, the Stanley Works.  
J. D. Warren, J. D. Warren Mfg. Company.  
A. W. Wagner, Stowell Mfg. & Foundry Company.  
A. B. Conover, John A. Roebling's Sons Company.  
Wm. G. Miller, Ohio Tool Company.  
W. H. Bennett, Reading Hardware Company.  
S. S. Gould, St. Louis Shovel Company.  
W. C. Heimbuecher, W. C. Heimbuecher & Co.  
W. C. Stephens, P. & F. Corbin.  
Henry A. Taylor, American Screw Company.  
A. B. Munro, American Wringer Company.  
Edward Dunning, Sargent & Co.  
W. A. Campbell, Wadsworth-Howland Paint Company.  
Richard Gedney, Yale & Towne Mfg. Company.  
C. F. Silvester, Winchester Repeating Arms Company.  
P. W. Holmes, Lalance & Grosjean Mfg. Company.  
W. H. Howard, Clinton Wire Cloth Company.  
Joseph Keene, Chicago Spring Butt Company.  
N. A. Gladding, E. C. Atkins & Co., Indianapolis, Ind.  
F. S. Kretzinger, Iowa Farming Tool Company, Ft. Madison, Ia.  
C. M. Avery, C. M. Avery & Co.  
Wm. Brunow, Geuder & Paeschke Mfg. Company.  
G. A. Kerr, Scoville Mfg. Company.  
C. A. Rosecrans, Allerton, Clarke & Co.  
L. S. Sherwood, Columbian Hardware Company.  
G. E. Lawson, Lawson Mfg. Company.  
Louis Bartling, National Enameling & Stamping Company.  
E. A. Snow, Plume & Atwood Mfg. Company.  
G. W. Turney, Rome Mfg. Company.  
R. R. Leeds, Russell & Erwin Mfg. Company.  
Robert Ketling, Tuttle & Bailey Mfg. Company.  
C. C. Wood and W. H. Darrah, Union Nut & Bolt Company.  
H. H. Roberts and Geo. W. Cope, *The Iron Age*.  
Daniel Stern and S. A. Johnston, *American Artisan*.  
Warren McArthur.

The banquet was enjoyable in every particular. The menu had been very carefully prepared and was artistically printed with appropriate poetical quotations. The service was more than satisfactory. Instrumental and vocal music added greatly to the pleasure of the occasion. Some high class vaudeville diversions were also a feature.

The speech making was not so prominent as usual at banquets because it was necessary to take a rather early train for Cleveland. W. H. Bennett was toastmaster. He called on D. W. Simpson, who made an eloquent address of welcome, and on H. A. Taylor, who paid a glowing tribute to the ladies. A hasty departure was then made for the Lake Shore depot, where special cars were taken for Cleveland.

## OPENING OF THE CONVENTION.

The seventh annual convention of the National Hardware Association opened this morning at the Hotel Hollenden, Cleveland. There was a good attendance of delegates at the opening session, while the representation of manufacturers was the largest at any jobbers' convention.

The first session was called to order by the president, Richard W. Shapleigh. After the opening prayer by Rev. S. P. Sprecher and the singing of "America," the freedom of the city was extended to the association by

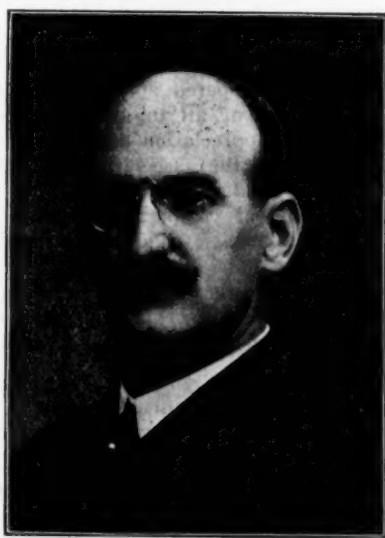
C. A. Cooley, Commissioner of Charities and Corrections, who referred pleasantly to the representative character of the gathering and extended a cordial welcome.

Chas. W. Pack, president of the Cleveland Chamber of Commerce, on behalf of that organization, and S. D. Latty of the Kirk-Latty Mfg. Company, on behalf of Cleveland manufacturers, also gracefully welcomed the members to the city.

Wm. Starke of Howden, Starke & Co., Montreal, president of the Canadian Wholesale Hardware Association, brought greetings from his organization, and James Hardy of Jenkins & Hardy, Toronto, the secretary-treasurer, told of work that had been accomplished by the Canadian Association.

With appropriate remarks H. B. Lupton presented President Shapleigh with a gavel on behalf of the local manufacturers.

J. H. Van Newkirk of Russell & Erwin Mfg. Company was unanimously elected general secretary of the



S. D. LATTY, Chairman Cleveland Manufacturers' Committee.

convention, and C. A. Jewett of the Geo. Worthington Company, railroad secretary.

The roll call followed, showing a good but not especially large attendance of the membership. The reading of the minutes of the last meeting was dispensed with.

President Shapleigh called Second Vice-President Brace Hayden to the chair while he delivered an especially interesting and able address, as follows:

#### President's Annual Address

The seventh annual convention of the National Hardware Association finds our organization in excellent condition, full of vigor and life, and ready to carry on the good work so successfully executed in the past.

It is a subject for intense gratification and pride to all of us that not for one year, or for any time, has the association retrograded in the least. Founded in conservativeness and wisdom, officered by broad minded and intelligent men, it has steadily pressed onward toward its goal of usefulness, and is to-day recognized as the

#### MODEL ORGANIZATION

of its kind in the United States.

Thanks are due to all the members who have by their steadfastness and co-operation aided in bringing this splendid condition to pass. Let us also not forget to thank our friends, the manufacturers, who by their recognition of the worthiness of our motives, and by their aid and counsel, have made effective many of the reforms inaugurated by us, and enabled us, in a large measure, to attain our present high standing.

We do thank them and we welcome them most cordially to our gatherings. Their presence here is the indication of their interest in us, which is no less than our interest in them—mutual interest must be the password between us.

We meet this year in the beautiful city of Cleveland, the birthplace of our organization; the premier city of the interesting State of Ohio, a State famous in many ways, but in no way so endeared to our hearts as in being the birthplace and home of our martyred chief, William McKinley. May the sweet influence of his broad charity and noble character pervade all our deliberations.

It is not necessary to review the growth and work of the association; its tribulations and trials; its many discouragements and its sometimes failures; suffice it to say that we stand to-day a great power in the Hardware world, and as great power entails great responsibilities, let us see to it that we use our influence always in a just and proper manner.

#### THE YEAR 1901.

Since our last gathering, in the hospitable city of Richmond, we have passed through a year of prosperity. Prices of raw material and also of manufactured goods have remained firm, and in many cases advanced, so that the value of stocks of goods to-day is somewhat more than that of a year ago. There have been no flurries or undue excitement in values. Trade as a rule has been strong and steady, and conditions now seem very bright, except in the few drought stricken sections, to which we extend our sympathy.

This is a pleasant retrospect, but let us not forget that the reverse of this lovely picture is bound to come sooner or later; then we must prove our true worth. It is easy to be good when times are prosperous, but when trade is dull and values are tumbling down we are too prone to let all holds go, and add to demoralization by adopting a policy of "every man for himself." Our association is a strong bulwark against a panicky market if properly used and if the members work in unison.

The gigantic corporations which are so omnipotent now will in times of rapidly declining values have it in their power to protect the innocent handlers of their wares, by using their vast influence against sudden and radical declines in price. We hope they will avail themselves of this great opportunity and prove that they can become a strong power for good to the community.

#### THE OUTLOOK.

The fact that values have not been unduly inflated and that a wise conservatism governed the large combinations of capital, in not pushing prices to too high a level, gives a rosy hue to the business outlook for the future.

Let us also be conservative; let us be loyal to the association, giving strength to its official actions by a hearty and unanimous support; thus we will benefit ourselves and our neighbors.

#### BENEFITS OF THE ASSOCIATION.

The work of the National Hardware Association is of a negative and positive kind, and the former, although not seen and scarcely heard of, is of as much importance as the latter.

All members become acquainted with the positive acts of the association, such as when the secretary has succeeded in establishing a proper differential in price, &c., but very few indeed are aware of the many times, when some abuse is about to be introduced that would rob the jobber of a previous 1 or 2 per cent. of net profit, the officers of the association, by prompt and wise action, have succeeded in having it abandoned. It is, therefore, our duty to be active and interested members, to correspond freely with the secretary and president, and to increase the general efficiency in every way possible. Let us all think of how much worse off we would be if there was no National Hardware Association, and each of us renew our loyalty to it.

The activity and usefulness of local and sectional jobbers' associations seems to be waning. This is a matter of serious moment and of deep regret. The national organization cannot possibly take their place, and we urge the rehabilitation of those already in existence and the formation of others wherever possible. This has been urged in former reports; it cannot be too strongly pressed, and we hope the members will take quick and decided action.

## RETAIL ASSOCIATIONS.

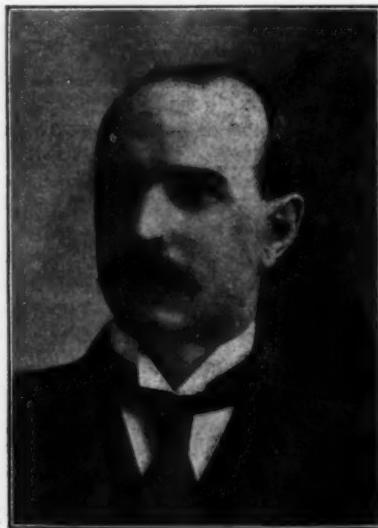
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## PENNY POSTAGE.

It is gratifying to note that the national Government has made some reform in the Postal Department by more stringent rules governing second-class matter. I, however, recommend that the resolution passed a year ago, in reference to penny postage, be reiterated, and if passed, that a copy thereof be sent to each Senator and Congressman.

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We are fortunate in having with us delegates from the Canadian Wholesale Hardware Association; we extend to them a most cordial welcome and hope they will participate in all our sessions, and discuss with perfect freedom all matters in which they may be interested.

The report of the secretary-treasurer will give the members the detailed information regarding the work of the association for the past year, and the report of the Executive Committee will outline the future policy and work; the latter report, as outlining the scope of the association's usefulness for the coming year, is of great interest to all. I trust it will be very carefully and thoughtfully considered.

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In conclusion, I cannot refrain from expressing the regret I feel that Mr. Bindley should have found it necessary to resign, after completing almost two years of splendid work for the association, and leaving in my unworthy hands the honor of presiding over this important meeting.

Mr. Bindley's administration has always been conservative, wise and energetic, and under his far seeing guidance we have prospered splendidly. I am sure I voice the sentiments of all in extending to him our hearty thanks and appreciation of his services.

Every president of the association has always been wonderfully aided and supported by the uniformly prompt and intelligent co-operation of the Executive Committee with both their time and counsel; I return them sincere thanks.

The secretary-treasurer has as ever been the right man in the right place, and his intelligent and active work has been a large factor in our success. May his shadow never grow less.

## Secretary-Treasurer's Report

Reviewing the work of the association during the year, Secretary-Treasurer T. Jas. Fernley in his report said that fewer complaints against manufacturers had been received during the past year than ever before, and also noted a gratifying increase in the membership. Mr. Fernley's report was as follows:

In presenting this, my seventh annual report as secretary-treasurer of this organization, I do not propose to inflict upon you a very lengthy report of the doings of the executive branch of your association, deeming such a course unnecessary, because of our system of keeping the membership constantly informed as to the work of the organization as it progresses during the year. We find, in looking over our files, that we have addressed the members of our association on an average of two and a half times a week since our last convention, and these communications show in detail what has been accomplished.

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as you know, is divided into two classes. First, internal. By this we allude to the efforts which are put forth to induce members of our association, first, to learn to regard one another as honorable men; second, to have introduced into the conduct of the individual businesses represented by our membership such business methods as will cause the machinery of trade to move with the least friction; third, to use the influence of the organization to the end that manufacturers may find it agreeable and profitable to distribute their goods through proper channels.

The second character of work is that among manufacturers. Under this head anything which is germane to the object set forth in our by-laws—namely, "the promotion of more friendly business relations and mutual confidence with manufacturers," has our daily thought.

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We are particularly pleased to report that many manufacturers are drawing nearer and nearer to their jobbing customers, realizing that this is by far the most economical method of distributing goods.

During the past year the seed which had been sown during the previous six years has gradually ripened, and

it may truly be said that the jobbing trade is reaping the harvest. While a few manufacturers will occasionally violate proper trade ethics by making prices to those not entitled to the same which are not in harmony with the policy of our association, even to some extent interfering with the legitimate retail merchant and offering goods to consumers, yet complaints regarding action of this kind on the part of the manufacturers are fortunately fewer than in any previous year. There is scarcely a day that we do not receive a number of letters from manufacturers, either operating singly or through associations, inquiring as to the character of business conducted by

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We believe that there is no more important field for our operations than this, and that in pursuing a policy of fairness, justice and liberality we are serving not only the interests of our own members, but also the interests of legitimate retail merchants.

The names presented by these manufacturers are not always those of reputable retailers, but in a great number of cases parties who are pursuing methods of distributing goods which are inimical to the interests of the retail merchant. We allude particularly to certain concerns who make a point of supplying the consumer



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and to those engaged in the department store and catalogue house business. If the principle of selling goods through these catalogue houses is a correct one, then there is no excuse for the existence of a jobbing or retail house. But we take the stand that there is no excuse for the existence of catalogue houses; that they are not a proper avenue of distribution. We think that substantial proof of this lies in the fact that there are only a few catalogue houses in the United States—that several who attempted the business have been forced to retire.

We strongly urge our members to let no opportunity which presents itself pass without making a strenuous effort to educate the general public, particularly the manufacturer, along the lines of the policy of our association—namely, that the natural channel through which goods should pass is from the manufacturer to the jobber, from the jobber to the retailer, and from the retailer to the consumer.

We would also call the attention of our members to the importance of urging manufacturers of Hardware and kindred lines to recognize the Hardware jobber as the proper distributor, and not complicate conditions by attempting to reach the wholesale grocer and Wooden Ware dealer.

#### PRINTED QUOTATIONS.

Several times during the year our attention has been called to the system adopted by some manufacturers of notifying the trade on postal cards and other printed communications of changes in prices. These are very

liable to fall into the hands of consumers. In each instance we have entered a protest, and after explaining to these parties the harmful effect of this method, we have received assurances that it would be avoided in the future.

It is well that the members of the association shall continually impress upon manufacturers the importance of refraining from notifying the trade of changes in prices by this method.

During the early part of the year our attention was called to extremely low prices made on several seasonable lines of goods by leading Jobbing houses, and while as an organization we studiously refrain from entering into price agreements, yet it is our policy, and has been, to use our influence on the members of the association to maintain manufacturers' established prices; hence, we called this matter to your attention.

Our membership shows a slight increase over last year.

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We commend the National Retail Hardware Dealers' Association of the United States and the Retail Hardware Associations of the various States to the consideration of the retail merchant. These organizations are officered by men of ability, and we feel that many of the difficulties which are confronting the retail merchant can be remedied through them.

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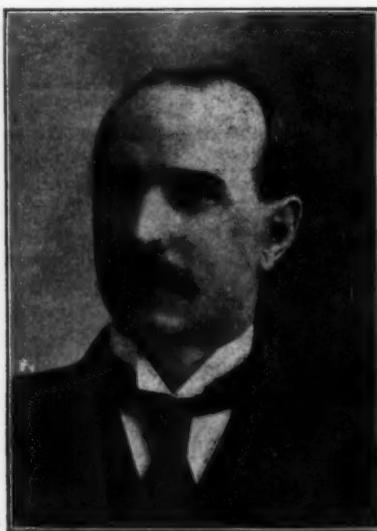
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It has also been our pleasure to attend, wherever possible, the meetings of these sectional and local asso-

ciations. We have also kept in constant correspondence with the secretaries of the same, aiding them with such suggestions as have occurred to us from time to time.

We are pleased to report that at the present time the following associations are in existence, and most of them in active operation:

The Southern Hardware Jobbers' Association.  
The Pacific Coast Hardware and Metal Association.  
The New England Iron and Hardware Association.  
The New York State Association of Hardware Jobbers.  
The Missouri Valley Hardware Jobbers' Association.  
The Texas Hardware Jobbers' Association.  
The Hardware Merchants' and Manufacturers' Association of Philadelphia.  
The Pennsylvania Wholesale Hardware and Supply Association.  
The Cleveland Hardware Jobbers' Association.  
The Nashville Hardware Jobbers' Association.

We again call the attention of local and sectional organizations to the importance of having some one employed whose duty it shall be to look after the interests of the organization. We feel that where these organizations lack in success it is because they do not have steadily employed a salaried secretary.

#### PREMIUM FOR ANTICIPATED PAYMENTS.

This is a subject which has been prominently before us ever since July of 1899, at which time the American Steel & Wire Company abolished what had been known as the cash discount, but what we more properly called a premium for anticipated payment. The action of the concern alluded to was followed by a large number of manufacturers, who felt that if one representative concern could insist on terms of net cash, without any premium, they also could take the same position.

You will remember that after one year's trial on the part of the corporation mentioned they deemed it wise to meet the views of the committee of our association having this subject in charge and restore, first, 1 per cent. of the 2 which they had taken, and a few months afterward the entire 2 per cent. This forward action on their part was quite speedily followed by a large number of other manufacturers.

This question was considered as practically settled; we gave wide circulation to the resolution which was passed in the Pittsburgh Convention in 1899, which reads as follows:

*Resolved*, That it is the sense of the National Hardware Association that the discount, 2 per cent. for cash in 10 days, formerly given by the manufacturers of Steel and Iron goods, be not construed as bank interest, but as a premium for prompt payment and as an insurance or protection of credits, and further that such or similar discount be retained where still allowed, and that we urge its restoration where it has been discontinued.

Unfortunately, during the past year we have found a few other manufacturers constrained to experiment with this dangerous expedient for increasing their profits, and, as the members of our association know, we have speedily taken up the subject with the manufacturers, as well as with the individual concerns in our organization, and have convinced, in almost every instance, the offending parties that it was to their interest to meet our views. We sincerely hope that our members will stand as a unit on this question.

The taking away of this premium for anticipated payment in every case means a reduction of our profits. Jobbing houses are compelled to concede 2 per cent. for anticipated payment to their customers, and it would be a hardship to the retail buyers of the country if the jobbers were compelled, through the action of manufacturers, to sell goods on terms of net cash.

#### TRUE COST.

You will remember that at the Richmond convention of our association in 1900 considerable time was devoted to the discussion of this question. We are pleased to report that some of our members have put this plan into general operation, but regret that we cannot report its general adoption.

It is useless at this time to go into any discussion as to the merits of the plan; these points have been very fully covered. We hope that during the approaching year an additional number of our members will adopt the system of adding to the factory cost of goods a

proper percentage to cover the expense of distribution, before arriving at the true cost.

On August 6 the gentleman whom you had elected as president of the association at the last convention, and who had served this association so acceptably as president during the previous year, resigned from the presidency, owing to the fact that certain private interests demanded his attention. The relations which existed between Mr. Bindley and your secretary-treasurer made the parting sad, but the fact that you had provided for such a contingency by electing to the first vice-presidency the gentleman who is now president of the association—Richard W. Shapleigh—revealed the “silver lining in the cloud.”

The present chief administrative officer of our association is the fourth under whom I have had the pleasure of serving. Presidents resign; presidents retire—but the writer has not felt constrained to do either, feeling more in love with the work of the association than ever. It is but fitting that due acknowledgment should be made of the continued confidence which has been bestowed by the members of our association, as well as by manufacturers, on one who is so unworthy.

It is our earnest wish that through our organization the distribution of Hardware will become more pleasant and profitable, and that those who have such almost inseparable individuality of interest with us shall also continue to feel that this organization is of great benefit to them. Thus may we hope to reach the *ultima thule* of our ambition.

#### THE ECONOMICAL DISTRIBUTION OF GOODS.

The colloquy in regard to the most economical distribution of goods was very interesting. The speakers agreed that this can be best done through the jobbing trade, but a number of points were brought out relating to matters in which the jobbers were regarded as not serving the manufacturers' interest, such as their unwillingness to introduce new goods, using special brands in many lines, instead of manufacturers' brands, and failure in many cases to maintain manufacturers' prices to the retailers. The following addresses were made:

**By William Bates, Sales Manager Kirk-Latty Mfg. Company, Cleveland:**

There may easily be several things in the economical distribution of Hardware and kindred lines which the manufacturer of to-day, in his haste to build up a large and rapidly increasing business, will overlook. The temptation to market his product through every available channel is one that is not easily withstood, and in a good many cases may not prove to be the most economical course to pursue.

The manufacturer who has built up a large business, but is satisfied to have his product flow to the consumer through a few large channels, finds himself in an untenable position if through any means one of these large outflow channels is cut off, for he has to build his bridges all over again at considerable cost. I would therefore say to the manufacturer who would distribute his product most economically, spare no pains in the choice of the path that will carry it most directly to the consumer, and see to it that this path is paved at the start so that it will stand the wear and tear of time.

“One cannot grow figs from thistles.” Therefore, if the manufacturer would distribute his product economically he must determine what jobbers cater most directly to the consumer of the particular product he manufactures, and devote most of his time and energy to cultivating the trade, respect and confidence of those jobbers.

#### SUPERIOR QUALITY OF GOODS.

This can only be done by first manufacturing a line of product that is second to none, something that the manufacturer can stand behind always and will not be ashamed of at any time.

This is done by the employment of skilled labor, the paying of fair wages and the careful supervision of the

product as it passes through its several operations in the mill.

Second, I would say to manufacturers, put up your product in nice, attractive packages, neatly papered or boxed and labeled. This is a very large factor in the economical distribution of a manufacturer's product, as the buyer will send repeat orders by mail for the goods that are put up so, and these mail orders, pro rated against the orders which cost him traveling expenses and other incidentals to secure, reduce the total expenses of distributing his product, and therefore, as I said, are a great factor in the most economical way that a manufacturer can distribute his product. Good judgment must be used in the employment of representatives; there is no economy in employing cheap salesmen.

#### COMPETENT SALESMEN.

A great many buyers never see the manufacturer himself, and he is only known to the buyer through the salesman and the quality of goods he manufactures. It is therefore necessary that the salesman be dignified and intelligent, and of strict integrity. Through possession of these virtues in a salesman orders are often secured to the manufacturer in preference to his com-



WILLIAM BATES.

petitors, who manufacture just as good a product, but whose representative does not, and never will, command the respect and confidence of the buyer. Cheap salesmen are very often, in fact, I might say always, weak-kneed, and are susceptible of being worked by a shrewd buyer who understands his business and recognizes in the salesman this element of weakness. There is surely no economy in employing the services of such a representative because they can be secured for a few hundred dollars a year less than the man who is thoroughly conversant with his particular line of business, and who can uphold the dignity of his position and command the respect, confidence and personal esteem of the buyer by his integrity and bearing. "By their deeds ye shall know them." Salesmen, command the respect of your customer if you would assist your employer in the economical distribution of his product.

The intelligent handling of correspondence materially assists in the economical distribution of a manufacturer's product.

The perfection the card index system has reached to-day enables a manufacturer to economically keep track of his customers and salesmen, and to solicit his customers' orders at the right time to secure them. This system also classifies his trade, and if applied rightly to his particular line of manufacture and faithfully followed up is also a very important factor in assisting the manufacturer to economically distribute his product. And so I might go on and tell you several more things that experience has taught me as an answer to this particular question, but time will not permit.

There are other gentlemen present here who are anxious to tell you their views on this subject, and so for them I will solicit your earnest attention.

**By Wm. M. Powell, Treasurer Columbian Hardware Company, Cleveland:**

It seems to me that every manufacturer must recognize that the originating customer for his product is the consumer. He may be a blacksmith, a carpenter, a farmer, a man who is building a house, or an article may be made for which the demand originates in the kitchen, the dining room, the parlor, or any other part of the home, but no matter what the article may be the consumer originates the demand. The manufacturer then must consider how to place his product in the hands of the originating customer.

The maker can create a demand, but he cannot sell direct from his factory to the consumer, but must use some channel, and this brings us to consider the retail dealer, and we find him well organized for the purpose. The retail dealer is part of a large class of honest, straightforward men. He must buy carefully and meet obligations in a satisfactory manner. He must deal honestly with his customers, and as a rule he knows every member of nearly every family in his territory. His desire is to sell the highest grade of article, and if he feels obliged to sell inferior goods he does so with an apology, and I have noticed that the dealer who sells the goods of highest merit is the one who owns his home and whose daughter has a piano and whose son a carriage, or the money is in the bank. A manufacturer has many problems to solve, and not the least is the placing of his wares into the hands of the consumer through the retail dealers of the country; and while he must consider the first cost of doing this he must also consider whether the method he selects is one that will tend to a permanent demand.

Can the manufacturer sell his product to the retail dealer direct from the maker's office? He certainly cannot—he must have a representation. There is no class of merchant in this country that stands higher in the business world than the Hardware jobber. His business is well organized, he has ample capital and fills the needs of the smaller dealers throughout the country. No class of business can be developed as the Hardware jobbing concerns have been without there being a legitimate demand for same.

There are four important factors to the Jobbing concern: The buyer, the traveling man, the retail dealer and the manufacturer. It has been my privilege a good many times to take a chair at a Hardware buyer's desk, and I have long realized that his position is one of importance, and as a class, I wish to state here, they are uniformly courteous and obliging. Sharp and shrewd, of course, but they will always listen to a story that a manufacturer may have to tell. They are posted, too, and can distinguish as to the shades of value of goods offered them. The manufacturer may often be led into deals that he may afterward regret, but why blame the buyer? The keynote to the whole situation is here, and when the buyer and maker both realize that each has his part to do, an ideal affiliation is brought about and each will be a source of strength to the other and goods will be placed in the hands of the retailer, through the jobber, at lowest possible selling cost.

The traveling man should not be forgotten—that genial, wholesouled, well posted man of the road; up early in the morning and late at night—but, of course, always on account of business. How well he knows every man and boy in every establishment that he visits, and how he wins the heart of the dealer. He laughs at the cold of winter and the heat of summer, and will even smile when he doesn't get an order, which is not often, and he is the great factor between jobber and dealer and the manufacturer and dealer.

The Hardware maker is bound to fall into some errors, and if his business is not well organized, or if he makes inferior goods, or if he pursues unbusinesslike methods in his works, or in his office, or with his trade, verily he will be like the grass in the fields.

Personally I am a firm believer that the manufacturer of small goods can distribute his product to better

advantage through the jobber than by any other method, for the reason that his traveling man is in close touch with the dealer and the jobber's selling expense is reduced to a minimum because of the large variety of articles that he has to offer; besides his study is to sell goods to the immediate factor between the jobber and consumer.

**By G. E. Needham of the Garry Iron & Steel Company, Cleveland:**

The subject you have assigned to me for discussion is "How Can Manufacturers of Hardware and Kindred Lines Most Economically Distribute Their Products?"

In considering this question and giving my views, it seems to me that some light may be obtained by relating my experiences along these lines for over 30 years, and they may be of some interest, if not amusement, to the members of this convention.

It is said that "Experience is a good schoolmaster." I think in my case this saying has been verified. My experience was not along the lines of Hardware, but kindred lines—viz.: Iron and Steel Roofing, Sidings, Ceilings, Conductor Pipe, Eaves Trough, &c. Our company, the Garry Iron & Steel Roofing Company, were among the first to commence this business, and may be considered the pioneer manufacturers of the above named material, therefore it became my business to market our

ation their ways and means and their willingness, providing we give them the money end of the business, to handle our products, we, as manufacturers, are forced to admit that the proper solution of the question is in favor of the jobber.

With their great army of traveling salesmen, composed of men of brains, business ability, tact and energy, going into every city, town and hamlet, daily and almost hourly, the jobber has pre-eminently the advantage over any other system that at this time presents itself to my mind for selling and distributing goods.

I think I am within the bounds of truth when I say that your association is the largest and most influential, representing the largest amount of capital, of any commercial organization in the country. I am in favor of association of this character, for it enlarges men's views by interchange of thoughts and ideas, destroys petty jealousies and lifts men on a higher plane of business principles, establishing harmony among the members and securing the confidence of your customers and the good will of the public.

In conclusion I wish to say that a closer and more harmonious business relationship should exist between the manufacturer and the jobber. Their relations should be placed on the base of live and let live, in perfect harmony and justice, on the universal brotherhood of man, and founded on the eternal principle of "Doing unto others as you would have others do unto you."

**By C. S. Van Wagoner of the Van Wagoner Company, Cleveland:**

Economy is one of the leading factors in the success of any business. We believe that a liberal economy, so to speak, saves the most money and gets the best results. A manufacturing concern that is honest all the way through, honest in its goods and in its dealings, and which also has good will that is hearty and genuine, has an advantage and a power in its favor that will in time establish strong and mutually valuable relations with jobbers of like character, and keep a flow of its goods through them to the consumer at a minimum outlay.

Fewer salesmen and less traveling expense, ruinous concessions to buy unstable trade and various other items of cost are saved if a manufacturer has secured a trade that is easily handled. Instead of rushing around the country to get the whole earth, if he will select as many substantial and favorably located jobbing houses as is reasonable without inviting attacks on his trade from his rivals, and will cultivate favorable relations with them, he will get his proportion of what the market takes at the highest average price and with the greatest economy.

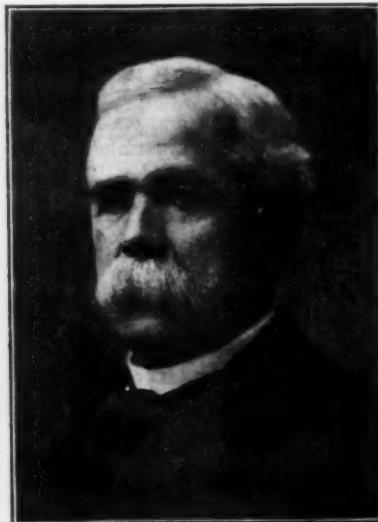
We therefore repeat that the most economical way for a manufacturer to market his product is to cultivate close relations with the jobbers best suited to place his goods, and if he has to buy his trade let him do it with fair dealing, good will and concessions that will not break his own market.

**By George V. Willson, Secretary-Treasurer Hussey, Binns & Co., Pittsburgh:**

I hesitate to speak to you upon a subject of such importance, the real answer to which determines whether the middleman is essential as the distributor between the manufacturer and consumer. I cannot expect to present new ideas and only hope to emphasize some which have already been considered in the past.

It would seem to me that under ideal conditions there can be but one answer to the question, and that the manufacturer of Hardware and kindred lines can most economically distribute his product by the aid of the jobber.

I say ideal conditions, meaning that almost millennium like time, when the manufacturer is satisfied to market his goods through the hands of the dealer, and maintains a proper distinction in price between the jobber, retailer and consumer; when the jobber is so in fact, and not alone in name, and does not take advantage of the prices obtained as a jobber to destroy the market of his customer, the retailer, whom he ought



G. E. NEEDHAM.

products. The question came to my mind, "What will be the best and most economical way to dispose of them?" Metal Sheets were well known, but not for roofing purposes; it therefore became necessary to educate the public to their practical use for purposes designed, and who should be the schoolmaster? Knowing the ability of jobbers for this work, I sought to make arrangements with them for this purpose. They kindly and gently informed me that a demand for them must first be created before they would or could do anything with them. These were the old school jobbers, doing business on the slow motive power, hence the demand had to be created, which was done through other sources: the consumer, the tinner and the retailer. The demand did come and came in enormous proportions, as evidenced by the thousands of tons of sheet metal that are used for these products yearly at the present time. The demands have been made, conditions for handling manufactured product are changed, business is being done on the high pressure and rapid transit principle. Now the question arises, "What is the cheapest, quickest and most practical way of marketing our goods?" The demand has been created—now the demand is, "What is the best and most feasible way of taking care of this demand?"

**IN LOOKING THE FIELD OVER**

I am satisfied that this problem can be solved through the agency of the jobber. When we take into consider-

to protect; when he lives up to the spirit of your organization, "the promotion of more friendly business relations and mutual confidence and good will with each other and with manufacturers," and when the retailer is content to act as the final distributor of the goods and is willing to recognize that the jobber is entitled to a lower price than himself.

**THE COST OF DISTRIBUTION IS NOT THE ONLY QUESTION** affecting the relations between the jobber and the manufacturer. The time was, not so many years since, when the private brands of dealers were practically unknown and the manufacturer had a just pride in the reputation of his goods and an inducement to maintain the quality of his various brands. In these degenerate days, however, every dealer, large or small, must have his private brands and labels, and, instead of being the agent for the distribution of the goods, poses both as manufacturer and distributor. The real manufacturer, therefore, in order to retain his identity, is compelled to seek the retailers or large consumers, who prefer high grade goods of the manufacturer's own brands, hence mere cost of distribution becomes a secondary consideration with him.

The manufacturers and jobbers are necessarily dependent upon each other, and, realizing that fact, should

sons why the manufacturer feels compelled at times to also act as the distributor of his own goods, even although it is not the most economical way.

Let us try to get closer together, realizing that although "shrewd business," as it is improperly called, may seem to prosper at times, still it is better to give the old fashioned definition to honesty instead of the "business" definition which sometimes prevails.

#### SESSION OF METAL DEALERS.

Immediately after the morning session the members of the association dealing in Tin Plate and Metals met for a brief conference.

#### The Arrangements

by the committee of Cleveland manufacturers for the entertainment of the association are very complete and the convention opens with promise of a very pleasant and successful meeting.

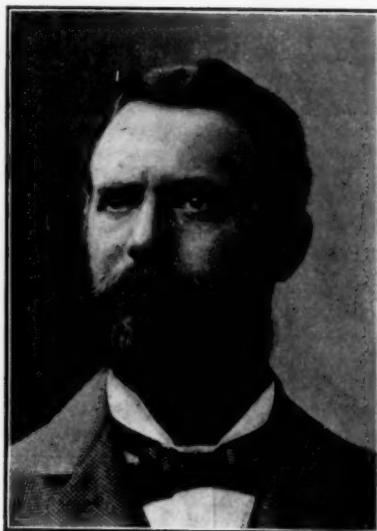
#### Outlook for the Approaching Year: Will Present Range of Prices Probably Prevail?

By Frank Dickerson, General Sales Agent American Tin Plate Company, New York.

It is an easy matter to figure out profits on paper before one embarks in business, but it is not so easy to get the ledger to agree with one's estimates. The ladies—those who are married—find it an easy matter, I hope and believe, to obtain a liberal allowance from those whom they call their lords and masters, but who really are their willing slaves; but is it so easy for these same ladies to make their cash accounts balance correctly, unless by the insertion of an item of "sundries" that may mean almost anything? So, gentlemen, it is easy for me to figure out a brilliant and profitable year for 1902, but it is not so easy for me to guarantee that the facts shall agree with such rosy predictions. I am not much of a prophet, any way, and if my speech should not please you there would be danger that my fate might be that of the Prophet Jonah, and that I might be swallowed by some great fish. Such a fate might make me an acquisition to some public aquarium, but would probably prevent me from ever again appearing before your association. Rest assured I shall be very careful; I do not desire to be thrown overboard, and I do desire to attend your next convention. Yes, gentlemen, I desire your good opinion, and hope to deserve it. I trust that I may say nothing that will move you to anger, or cause you any sad thoughts. You remember the case of the woman who was brought to court for assaulting her husband. In reply to the question of the judge she acknowledged hitting him, but declared that the weapon proved she had done it more in sadness than in anger. "With what did you hit him?" said the judge. "Your Honor, I hit him with a sad iron," was her reply.

#### SUPPLY AND DEMAND.

The price of any commodity is regulated by the old law of supply and demand. Under present conditions the manufacturer is enabled to exercise more control of the supply than formerly, but when it comes to the demand the jobber can judge quite as well as the manufacturer. Were I to stand up here before your honorable body of gentlemen, who know the situation so well, and attempt to prophesy as to the demand for 1902, I might be complimented as was another speaker under like circumstances. At the close of his talk one of his auditors said, "I liked your speech the best of all." "Why," was the reply, "you sat so far back that I thought you would be unable to hear." "That's so," said his friend, "but I could see your jaws work." These large corporations insure you against any sudden and unwarranted increase in the supply, and all that we ask of you is to keep up the demand. Buy just as much in 1902 as you have bought this year, and if you please, gentlemen, buy a little more in 1902 than you did in 1901, and then prices will remain firm. You have the ability to buy 50 per cent. more; we only ask you to buy 15 per cent. more. You may say that you do not want any more; some may say that they do not want as much



GEO. V. WILLSON.

treat each other in the spirit of mutual kindness and good will.

I have, as a member of an association of manufacturers, with which you are familiar, had the privilege of coming in contact with various committees representing your organization quite often during the past five years, and while we have not always been able to agree upon certain lines of policy, and have had occasion to change our views upon important points during that time, still I wish to express my appreciation of the almost universal spirit of fairness which has prevailed.

#### THE JOBBERS' PROFIT.

The manufacturers desire to aid the jobbers in every reasonable way, for it would only be good business policy to do so. We try to protect you to that reasonable margin of profit to which you are entitled, and encourage you in every way to obtain it, for at no time is our business so satisfactory as when our friends are obtaining proper compensation for distributing our goods.

There is one point which I would like to impress upon you right here, and which so many seem to overlook—namely, that the proper place for the jobber to look for his profit is from his customer, and not from the manufacturer. It is hard enough for the latter to make his own profit, to say nothing of also making a profit for you.

I have strayed somewhat from the subject, but in doing so have endeavored to indicate some of the rea-

next year as they did this year. All right, gentlemen, that is equivalent to saying that you do not want a firm market. And right here I would like to call the attention of you merchants to the fact that it is possible to carry too small a stock of goods. Some of you—especially those from the East—found the inconvenience of small stocks last summer during the steel strike, and had your stocks been as large as they should have been, you would have been richer by many thousands of dollars to-day. The company I represent could work for an entire month full swing and the production be absorbed by the jobbers of this country without increasing the stock above the normal.

**"IN TIME OF PEACE, PREPARE FOR WAR"**

has been ascribed to George Washington, and it may be that it is so; but the thought was first uttered by Horace, and is as true to-day as when first offered to the world. The same thought, as applied to commercial conditions, was uttered by Joseph when he interpreted the dream of Pharaoh nearly 3500 years ago. You will remember the dream, it was of seven lean kine who swallowed up seven fat ones; and the interpretation was that seven years of poor harvests and bad business would succeed seven years of plentiful harvests and good business. Now this year of grace that is now drawing to a close is the third year of good business and large profits; but who shall say that there are to be four more? There may be, and I hope there will be. Others will say that the panic years of the past century were 1817, 1837, 1857, 1873 and 1893—intervals of 20 years in every case except one, when the interval was 16 years. Those who would argue from these statistics will tell you that we need not look for a severe shrinkage in values until 1909 at the earliest, and possibly not until 1913. Such optimism may be correct, and I hope that it may be, although I shall be satisfied if the great prosperity of the past three years shall reach the magic number of seven.

**INFLUENCE OF COMPETITION.**

The commercial sky is clear to-day and business is good. The clouds are so few as to be scarcely in sight. There is prospect of competition in some lines, and competition affects prices very quickly. Often the prospect of a lively competitor coming into the market will reduce prices materially before the goods are on the market. Very large and heavy competition will reduce prices until there is no profit to the manufacturer, and in an experience of 20 years as a merchant I have found that the merchant's profits were best when the manufacturer's profits were best; when the manufacturer made little or nothing, the merchant's profits were also little or nothing. Gentlemen, I do not say this because I represent a manufacturing company, but because in my experience this is true. Probably every one present can testify that there is more money in selling some one article than in selling some others, and if you investigate I think you will find that the profitable article is invariably one that pays the manufacturer handsomely. The article which pays but little profit to the merchant is sold by the manufacturer usually very near the cost. If there be in this, my experience, a hint not to be too ready to encourage competition, I trust that those who hear will profit thereby.

Business is very largely influenced by the political situation, and therefore business men are keen observers of the Government, and sometimes themselves dabble in politics. Our hearts are still sad with the crime of September 6, and there are none whose tears have not flowed for the murdered President, and the deepest sympathy from all is still strong for his widow. It is most creditable to the American people that the sympathy shown has been so general and so deep, and it is a wonderful monument to the strength of our institutions that this terrible shock has been borne so well in commercial and financial circles. Perhaps the greatest reason of all that there was so little disturbance during the past month in the mercantile community lies in the frank and manly attitude of President Roosevelt, who in ringing words has declared his purpose to carry out the plans and policy of his predecessor. Though there may have been to individuals much of sorrow and pain during 1901, yet the great majority of us will come

to our national Thanksgiving Day with hearts grateful to God for the multitude of blessings received during the first year of the Twentieth Century.

**THE FUTURE PROSPECTS.**

But, Mr. President, my business here is to prophesy as to the future, and not to rejoice over the past. And yet we are told that "the only way to judge of the future is by the past," and it is for this reason that I have referred to the past, and especially to the last three years, which all men will pronounce to have been good ones. I do not wish to weary you with statistics and details, but in a general way to refer to the fact that the conditions of trade and commerce are much the same now as they were a year ago. True, the harvest this year may fall short of that of 1900, but when all is gathered and the aggregate summed up, I believe that the difference will be so slight as not to interfere with the prospects of good business for many months to come. Railroad earnings are fully up to 1900, and in nearly all lines of business the outlook is good, so that in the words of the hymn we may say, "Every prospect pleases, and only man is vile." The ladies will please observe that in this case the word "man" does not



FRANK DICKERSON.

embrace the women. When earnings are large and money is plentiful, people spend freely and prices have an advancing tendency, and this is one reason why the optimist now looks for higher prices during the coming year. We are all willing to acknowledge the truth of this, but as high prices tend to diminish consumption, it has ever been the policy of the best managed of the larger manufacturing companies to be most conservative in advancing prices. The next six months will undoubtedly see some goods at higher prices than those now ruling, and it is not impossible that other goods are too high to-day, and that lower prices will prevail; but in the main it seems to me as most probable that the present level of values will continue for some little time to come. A man whose hobby is sleight-of-hand tricks has a son of eight years, who has been most carefully reared. The little chap is allowed to eat but one piece of cake at the Sunday night supper. A few Sundays ago, as they were finishing the evening meal, he said, "Papa, have I shown you my new trick of swallowing something?" "No," said the fond father, "but I would like to see it." "Well," said the lad, taking up a knife, "that is most too sharp." Then taking up a plate he said, "That's much too large. May I take something else, papa?" "Go ahead," said the old man. "Look," said the boy, as he grabbed a large piece of cocoanut cake and by main force thrust it into his mouth. Now, Mr. President, that is the way Johnny did his trick, and I have tried to do my little trick for your benefit; but in your case it is you and the gentlemen of the National Hardware Association who have had to do the swallowing, while I, like the fond father, gaze in

amazement that you have swallowed all that I have said.

By J. C. Brainard, Sales Manager Johnson & Jennings Company, Cleveland.

In olden times when a nation or body of men desired to know the prospects of the future, they consulted soothsayers and astrologers, who derived their power from their supposed ability to read the stars and their association with the devil.

The business man of to-day must go it alone, and when in search of like knowledge must derive it from his judgment of the condition of crops, raw material, factory capacity and domestic and foreign demand.

The farmer is well known to be a large consumer of all lines of manufactured products, and the abundance of his crops and his ability to market them at a good price goes a long way toward the assurance of a prosperous year.

#### THE AGRICULTURAL REPORTS

for this year are favorable for a good wheat crop and an average corn crop in this country, and for a shortage in South American and Russian cereals. This should assure the maintenance of the present prices for American food products.

The reports on the cotton crop are not so favorable, and should the shortage be as heavy as some authorities claim prices on cotton will probably be materially advanced.

The past two years have been exceptionally good among our farming community, and the farmer is to-day a man of means and is buying new tools and machinery and remodeling old or building new buildings.

The agricultural implement makers began manufacturing for the coming season fully four to six weeks in advance of the usual time, and they are making goods that are already sold.

The malleable iron trade, an industry that is closely allied to the agricultural implement business, and is an industry that in iron circles is considered a very good barometer of the trade, report unusual activity and large contract orders. They are pushing the furnaces for pig iron and are not getting their raw material as promptly as they desire. This shows a shortage in certain irons; in fact, as we all know, the mills, especially those that produce material used by the Hardware trade, such as Pipe, Wire, Sheets, &c., are far behind on orders to-day. It will be months before they will be caught up so that deliveries will reach the normal conditions.

#### THE RECENT STRIKE

of the Amalgamated Association curtailed the output of Tin Plate, Sheets, Hoops, Pipe, Bars, &c., at least 250,000 tons, and caused a very marked shortage in this line. In the case of some, markedly Sheets and Tin Plate, this shortage allowed the few factories that had any stocks on hand to obtain a large premium for immediate deliveries. This abnormal condition cannot exist much longer, and prices in these lines must return to their normal level.

Good authorities claim that had the strike not occurred and thus curtailed consumption, certain grades of pig iron would, owing to the scarcity, certainly have advanced in price. Within the last ten days foundry pig has advanced 50 cents per ton, and I am informed on good authority that an additional advance of from 50 cents to \$1 may be expected. Two of the large furnaces in this section that make a specialty of Scotch irons are practically sold up for the next six months, and the balance have no surplus in this trade. The stock of pig iron has been largely reduced of late, and all grades are very active.

#### THE ELECTRIC RAILROAD.

Nearly every day large companies are being formed and contracts are being let for the construction of electric railroads. It is an accepted fact that the electric railroad is the coming road for short distance travel, and in a short time the more thickly populated States will be covered by a network of these lines connecting every city and town of any importance. These roads

are a vast factor in the trade to-day, and will continue to be for some years to come. They consume both in their construction and maintenance large quantities of iron and steel, both in rail, bridge and track supplies, and in those lines of manufactured articles so well known to the Hardware trade.

#### IRON FREIGHT CARS.

The transition from the old style wood and iron freight car to the modern pressed steel car is going steadily forward, and with increased rapidity. One company in this line of business are alone consuming 1600 tons of steel daily, or a yearly consumption of over 500,000 tons. The new steel car is of much larger capacity than the old wooden car, and the use of these large cars has necessitated the use of heavier rails and the construction of stronger bridges. Larger and more powerful locomotives are in order, and the strictly up-to-date railroad will have engines capable of hauling as large a number of the new type cars as they formerly hauled of the old type.

Steel rails are being contracted for to-day for 1902 delivery at an advance of \$2 per ton over present year prices, and mills report the outlook very favorable for all lines of railroad material.

#### SHIPBUILDING.

The shipbuilding industry throughout the country is very busy, that of the Great Lakes being taxed practically to its full capacity for the entire winter and spring season.

#### THE ORE INDUSTRY

has been very heavy this year; in fact, larger than ever before, and it is conservatively estimated that over 20,000,000 tons will be brought down from the upper lake region before navigation closes, and that the amount of ore at the mines and on docks will be less than for several years past. This, in view of the fact that it has been a year where ore users have bought for immediate use only, and not on a speculative basis, would tend to show an exceptionally good outlook for next year. The oremen are taking a conservative but firm view of the 1902 market; and while it is impossible for any outsider to say just what prices they will determine on for the coming year, the compass points to at least as good, if not better prices than this year.

#### HARDWARE STOCKS

throughout the country are badly broken in many lines, and must be filled up before the spring season begins, as ability to fill orders is to-day one of the important adjuncts to success, and no line of trade more thoroughly appreciates this than our Hardware friends.

#### CONCENTRATION OF INDUSTRIES

is the order of the day, and it seems to me that this is much more of a benefit than a curse to the country at large. Where the power to fix and maintain prices in a large percentage of the industries of the country is centered in the hands of a few gigantic corporations, as it now is, and these corporations continue to show the fair and conservative spirit they have maintained so far, both toward the buyer and the laborer, it acts as a most reliable governor on the entire business of the country and assures a much longer season of prosperity than the old régime, where the timid manufacturer thought to fill his factory with work at just a little under the prevailing market, and by so doing carried the market down with him.

#### FOREIGN TRADE

has fallen off quite largely, especially in the iron line. Germany, Austria and France are in the throes of one of the periodical trade depressions that sweep over a country from no seemingly explainable cause. England, who is our best market to-day, has reduced prices on her home products to meet American competition, and Russia's retaliatory tariffs have for the time blocked our trade there.

#### THE NEW AMERICAN POSSESSIONS

will no doubt use more of our goods next year than ever before, but this will in but a very small measure make up for the large European deficit. The Oriental trade, especially that in China, is bound in the near

future, now that the wall has been torn down, to be a great benefit to this country; but this can be counted on to but a limited extent for the coming year.

We were stunned when the news of the death of our great citizen and President, William McKinley, was flashed over the wires, and business stopped for the moment. Under his administration we knew a universal prosperity, greater than any before in the history of the country; under his administration our relations with foreign nations were the best, and our domestic affairs in flourishing condition. The assurance given us by our present President, Theodore Roosevelt, that it is his firm intention to continue the wise and just policy mapped out by his great predecessor, sets all our fears at rest and we can move forward with confidence.

#### PRICES FOR 1902.

Taking the foregoing as a basis we may, I believe, safely conclude that the prices for the first six months of the coming year will be fully up to those now ruling. This year we have not experienced the usual midsummer depression; this may be expected next year, and will not be considered unusual. The prices for the last six months of 1902 are problematic, but I am of the belief that while there may be, and probably will be, an averaging up, they will continue throughout the entire year to be well maintained.

I have great confidence in the Yankee nation and its ability to maintain the position it now holds—that of the leading commercial power of the world.

#### ONEIDA COMMUNITY.

THE ONEIDA COMMUNITY have been reorganizing their business in many ways. Young and energetic men have been put in responsible positions, and manufacturing facilities have been increased. Animal Traps, one of the important departments of their manufactures, have always been made at Sherrill, about 1½ miles from the town of Oneida, N. Y., where they also had their silk factory. The silk factory has now been replaced by a new building at Kenwood, just within the limits of Oneida (where they have various other factories), which covers a ground space of 80 x 180 feet. They have taken the original silk factory at Sherrill for the manufacture of Chains, which they make for a great variety of purposes, and have transferred their entire Chain making plant from Niagara Falls to this point. They have also run a spur of the West Shore Railroad up to the Sherrill factories, which greatly improves their shipping facilities. Other changes are in the line of improvements in connection with their Flat Table Ware department, which includes a large variety of Silver Plated Knives, Forks, Spoons and kindred goods.

#### THE WESTLAKE SEWING MACHINES.

THE WESTLAKE MFG. COMPANY of Chicago have just issued a most comprehensive and handsomely illustrated catalogue of the New Howe, Kensington and Westlake Sewing Machines. The company state that marked improvement has been made in every feature of their machines. A ball bearing stand of new design and perfect in principle is now being used. The New Howe wood work has been changed to a highly polished quarter sawed style throughout. A prominent specialty to which the catalogue calls attention is their new Automatic Five-Drawer Lift and Drop Cabinet, which has proved itself a leader in sales. The Westlake Company are building up a large trade in Sewing Machines and will be pleased to send their new catalogue to any Hardware merchant making application.

Keller & Co., Cuero, Texas, issue a 20-page illustrated pamphlet, the front page of which is headed "Cuero's Dependable Holiday Store." Among the illustrations are photographic reproductions of different departments in the store. Considerable space is devoted to lists of goods as appropriate for boys and girls, young ladies and young men and ladies and gentlemen. The pamphlets are distributed by wrapping one up in each package of goods sent out and by inclosing one in each letter

leaving the store. The company have issued pamphlets each year, with improved features each time. The returns in the way of business have been very gratifying.

#### WABASH SCREEN DOOR COMPANY.

THE WABASH SCREEN DOOR COMPANY, manufacturers of Screen Doors and Stove Boards, have established their general offices in a fine suite of rooms on the eleventh floor of the Marquette Building, Chicago. The company found their factory at Rhinelander, Wis., of insufficient capacity to meet the demand for their Screen Doors and have located an additional plant at Memphis, Tenn., which is now rapidly approaching completion and is expected to be in operation, turning out stock by November 1. The new factory is of large size and will double the company's capacity for the production of Screen Doors. Its location will also enable them to take much better care of their Southern trade, which is developing rapidly and will undoubtedly reach large dimensions in the near future.

#### BOSTON BELTING CO.'S NEW CATALOGUE.

BOSTON BELTING COMPANY, Boston, Mass., and 100-102 Reade street, New York, have just issued a comprehensive and finely printed catalogue of Mechanical Rubber Goods, containing 164 pages. This business was established in 1828 and the company are manufacturers of a large assortment of Belting, Hose, Packing, Tubing, Rubber Covered Rollers and Mattings for a great variety of uses, together with Printers' Blankets, Cements and various Molded Rubber Goods for diverse purposes.

#### TRADE ITEMS.

AT a special meeting of the directors of the Champion Rivet Company, held on September 28, William C. Winterhalter of Pittsburgh was elected secretary and Henry Chisholm treasurer. Mr. Winterhalter was connected with the Riter-Conley Mfg. Company of Pittsburgh for 14 years as assistant to the general manager. He will now take charge of the business of the Champion Rivet Company at Pittsburgh, where this company are building a modern rivet factory. Mr. Chisholm is a son of the president, Wilson B. Chisholm, formerly vice-president and general manager of the Cleveland Rolling Mill Company. He is a graduate of Yale, class of 1901. In addition to his position as vice-president, D. J. Champion was elected general manager.

A. C. GREENING, secretary and treasurer of R. K. Carter & Co., New York City, has just returned from a pleasure trip to England begun a few weeks ago.

PAGE BELTING COMPANY, Concord, N. H., manufacturers of Oak Leather Belting, Mechanical Rubber Goods, Lacing and Mill Supplies, now have a branch house at 17 Murray street, New York, in charge of John A. Coe, under the supervision of Greene, Tweed & Co. A full line of Oak Tanned Leather Belting in all grades and kinds is carried at this depot, and sold at the same prices as would be made from the factory in direct transactions. Mr. Coe makes his headquarters in New York, and was formerly with the New York Leather Belting Company, and later proprietor of the Manhattan Leather Belting Company. He now gives his entire time to this line of goods, with which he is especially familiar.

C. M. McCLEUNG of Knoxville, Tenn., was in New York on Tuesday, having just returned from a four months' pleasure trip in Europe.

C. E. JENNINGS, who left New York August 14 on a business trip to Europe, returned October 1. While absent he visited the trade in Germany, Belgium, France and England. One thing that impressed him was the affection the English manifested for President McKinley and the respect in which this country is held. American manufacturers of tools and machinery have apparently firmly established their prestige abroad.

JOSEPH F. MCCOY of the Joseph F. McCoy Company, New York, who went to Europe August 24 on a pleasure trip, returned October 1. He visited principally London, Cologne, Solingen and Paris.

## USE TIME TO ADVANTAGE.

BY T. R. IMMER.

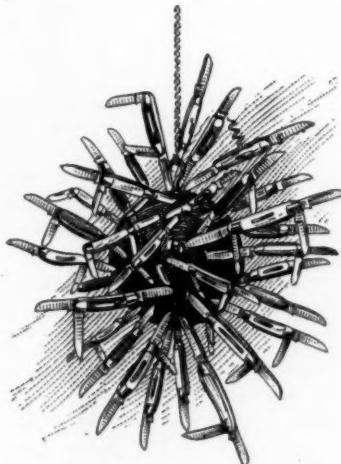
Time is money, and, like money, should not be spent foolishly. This should be remembered by the window trimmer. Never start to decorate a window without having formulated or sketched out a definite plan. In designing a display avoid making it so intricate that when completed the window will fail to show the time and labor expended on it. Work that does not show is labor lost, or time wasted.

Expend time and energy on the part of the display that shows most and that draws the public's attention. Fix it up so that they will be pleased, for if they are not pleased you cannot do business with them. The object of a window is to attract, please and sell. Do not skimp any part of the window, but do not work in a lot of unimportant details. They are the things you fuss over and it frequently happens that the more attractive they are made the more they draw from the central display and thereby lessen the efficiency of the window.

Do not spend six hours on the minor details and have only one hour left for the major attraction. Spend the time in the window so that every minute shows from the sidewalk. Divide the time so that the best effect is obtained. Remember it is better to devote three hours every week to window dressing than six hours every two weeks. Remember, also, that simple displays frequently changed bring more business than elaborate displays seldom changed.

## A BALL OF POCKET KNIVES.

How to display Pocket Cutlery in the most attractive manner is a question frequently asked by Hardware merchants. A method in use by the F. Hallock Company, Derby, Conn., shows the Knives to good advantage



*A Ball of Pocket Knives.*

and at the same time makes an exhibit which is pleasing to the eye.

Five or six cork balls of from 3 to 4 inches in diameter are suspended in the show window by small chains attached to a good strong screw hook in the top of the ball. Into these balls of cork Pocket Knives are stuck, all of the blades being open, the balls being covered as thickly as is consistent with good effect. This display, it is stated, has always proved an attraction, and has excited considerable attention from passersby.

If difficulty is found in securing a cork ball, it is suggested that thick pieces of cork can be glued together and rounded by means of a knife and sandpaper.

Mears & Calhoun have succeeded Mears & Bowlin, Cashion, O. T., dealers in Shelf and Heavy Hardware, Stoves and Tinware, Agricultural Implements, Buggies and Wagons. The new firm are enlarging the store, and when the improvements under way are complete its dimensions will be 40 x 80 feet.

## AMONG THE HARDWARE TRADE.

Emmert & Price have purchased the Hardware, Tinware and Farm Implement business formerly conducted by J. H. Kelsey & Son, Benton, Iowa.

Chas. F. Stahl has acquired the Hardware business heretofore carried on by M. Stahl, at La Rue, Ohio.

C. P. Brown & Son are successors to J. T. Bugbee, Lakeport, N. H., dealer in Hardware and Agricultural Implements.

J. W. Dragoo has admitted a partner in his Hardware business in Miami, I. T., and the style is now Dragoo & Creamer.

W. A. McCall & Son have lately engaged in business in Hobart, O. T., handling Shelf and Heavy Hardware, Stoves, Tinware, Agricultural Implements, Sporting Goods, &c. The firm also have a house in Nocona, Texas.

Getts & Getz Bros. have succeeded E. M. Getts in the Hardware, Stove, Farm Implement, Sporting Goods and Wagon and Buggy business in Delta, Colo.

Wm. F. Andrews has purchased the Hardware, Stove and Farm Implement business of Armstrong & Rider, Union, Iowa. Mr. Andrews intends to increase the stock thus acquired.

J. K. Staples & Son have disposed of their Shelf Hardware, Stove and furniture business in Nelson, Mo., to D. H. Louderback, who expects to double the stock thus purchased.

Tarrant & McGowan, dealers in Hardware, Stoves and Miners' Supplies, Reeds, Mo., have sold out to C. B. Hood, who will continue at the old stand. Messrs. Tarrant and McGowan desire to devote more attention to their Zinc mines in that locality.

George Givens has disposed of his interest in the Hardware and Farm Implement business at Wapella, Ill., to W. R. Carle, and the style is now W. A. Graham & Co.

Beardsley & Son, Norman, O. T., have been succeeded by Beardsley Hardware Company, who have enlarged the storeroom and added Wagons and Buggies to their former line of Shelf and Heavy Hardware, Stoves, Tinware and Agricultural Implements.

W. D. Chase & Co. have bought the Hardware, Farm Implement and Wagon and Buggy business formerly conducted by McGrath Bros., Woosung, Ill.

Roach, Christian & Co. have succeeded J. D. Roach & Co. in the Hardware, Farm Implement, Buggy and furniture business in Campbell, Texas.

Kerr & Hursh are successors to H. M. Durrett, Wichita Falls, Texas, dealer in Shelf and Heavy Hardware and Stoves and manufacturer of Saddlery.

John W. Russell's Hardware store, 2220 and 2222 Boston street, Baltimore, Md., was robbed a short time since of about \$75 worth of goods. Mr. Russell has recovered some of the booty, but no arrests have yet been made.

W. B. Cox has bought the Shelf Hardware and Stove and Tinware business of John H. Robson, Ovid, Mich., and is continuing at the old stand.

W. E. Watkins & Bro. have succeeded W. E. Watkins in the wholesale and retail business in Hardware, Stoves, Tinware, Farm Implements, Sporting Goods, Harness, Wagons, Buggies, Sash, Doors, Queensware, &c., Mena, Ark. The stock comprises about \$5500 worth of goods.

**BUFFALO SCALE COMPANY'S PAN-AMERICAN EXHIBIT.**

The exhibit of the Buffalo Scale Company, Buffalo, N. Y., is in the Manufacturers Building and occupies 420 square feet. Their booth is of quartered oak, finished in

**BOSTON BELTING COMPANY'S PAN-AMERICAN EXHIBIT.**

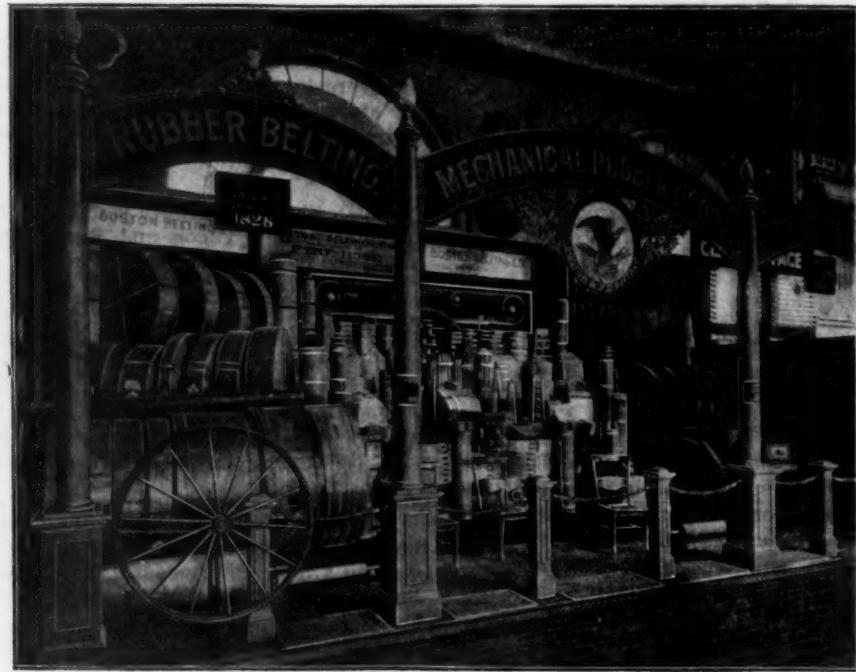
The exhibit of the Boston Belting Company, Boston, Mass., is a very comprehensive one in all its details, ranging from Rubber Belting to the smallest sized



*Buffalo Scale Company's Pan-American Exhibit.*

dark Flemish. The design is particularly attractive. In their display of fine Weighing Machinery may be seen much that is new, and there are Scales for almost every line of manufacture and trade. Some of the most interesting features are an All Metal Suspension Furnace

goods manufactured by them. Their space is 28 x 12 feet, in which a handsome and very creditable display is made. Among the goods shown deserving of particular mention are Belting, Packing, Valves, Rubber Covered Rolls, Cotton Rubber Lined and Unlined Linen



*Boston Belting Company's Pan-American Exhibit.*

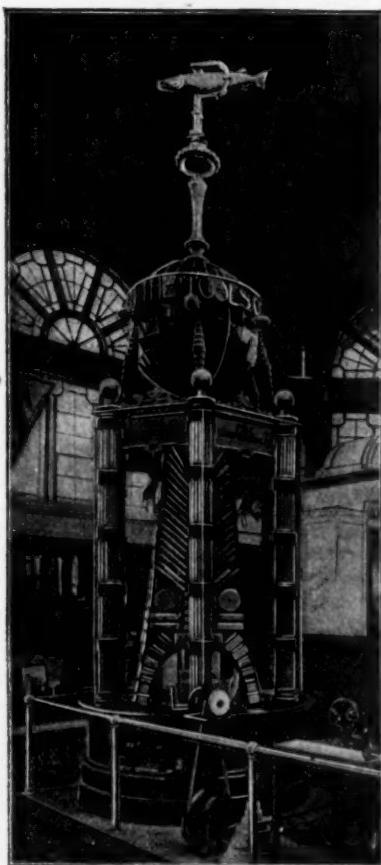
Charging Scale, the working model of a Railroad Track Scale, Polished Forgings and parts of various Weighing Machines, Recording Beams for Track and Portable Scales, Iron Testing Machine, new designs in Counter Scales, besides a variety of Dormant, Wheelbarrow and Heavy Portable Scales.

Fire Hose, Hose, Gaskets, Mats, Matting and Treads, Deckle Straps, Tubing, &c.

Geo. H. Clarkson has bought the Hardware, Stove and Sporting Goods business of J. F. Hortenstein, Laredo, Mo., and will continue at the old stand.

## PIKE MFG. COMPANY'S EXHIBIT AT BUFFALO.

The Pike Mfg. Company, Pike Station, N. H., are exhibiting their complete line of Sharpening Stones in the Hardware Section of the Manufactures and Liberal Arts Building. The main feature of their exhibit is the handsome booth which they exhibited at Paris, consisting of a mahogany base 6 feet in diameter, upon which is erected a strong obelisk 8 feet high covered with moss green plush, upon which are artistically arranged a complete sample line of Scythe Stones, Oil Stones, Razor Hones and other Sharpening Stones in all sizes and



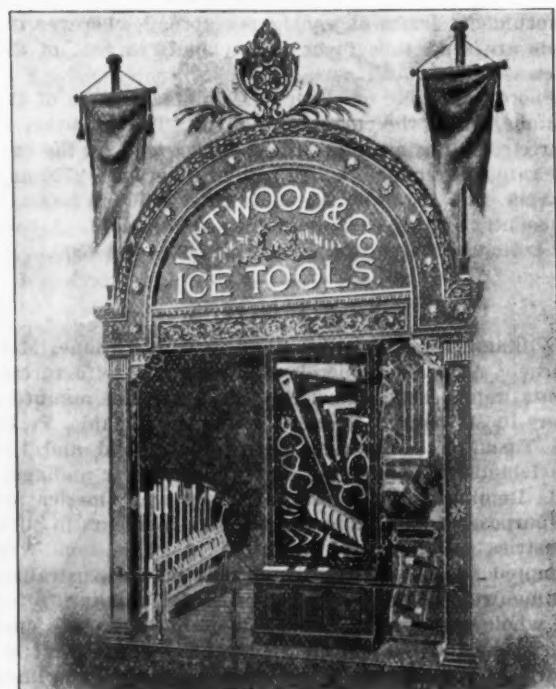
Pike Mfg. Company's Exhibit at Buffalo.

shapes. The obelisk is surmounted with a colored glass globe representing the world, from the top of which rises a gilded finial bearing the well-known trade-mark of this company, the capital letter P with a pike fish passing through the loop. Around the obelisk stand six columns of the same height as the obelisk formed entirely of Sharpening Stones arranged in sections, the name of each variety appearing on a polished brass ring encircling the columns at regular distances. The color of the Stones composing these columns is graduated from a dark steel gray at the bottom to snow white at the top, giving a striking and harmonious color effect. There are over 500 different shapes and varieties of Stone for sharpening all kinds of edge tools displayed in this booth, varying in value from the low priced Kitchen Sandstone, worth 2 cents per pound, to the delicate Arkansas Oilstone, finished to the fineness of a needle point or knife blade and worth in some shapes as high as \$50 a pound. A particularly noticeable feature is a large Washita Oilstone extending under the arch of the obelisk, said to be the largest Oilstone in the world. It is made from a solid piece of Washita Stone, measures 4 feet in length and weighs over 200 pounds. The entire booth above the base is inclosed by large plate glass panels, protecting the samples from dust. The total height of this booth is 22 feet. Aside from the booth they show a complete line of Razor Hones from Belgium, Germany, Austria and Japan and of India Oilstones, Scotch Water-of-Ayr Hones and some other special lines

displayed loose in special glass top cases, where they can easily be handled and inspected by visitors. They also exhibit an attractive line of Foot Power Grinders, Mower Knife and Tool Grinders, imported Craigleath and Bavarian Grindstones for glass cutters' and cutler's use, Soapstone Foot Warmers and Griddles, special Knife Sharpeners, Polishing Powders, &c. This company also have a specimen exhibit of Corundum and Emery Ore from all known deposits throughout the world in the Mines Building, said to be the first collection of its kind ever exhibited. Most of these specimens were collected by Joseph Hyde Pratt, Ph.D., Assistant State Geologist of North Carolina. In connection with this specimen exhibit they show a small line of manufactured Stones from both Emery and Corundum and from natural abrasive rock.

## PAN-AMERICAN EXHIBIT OF W. T. WOOD & CO.

In the accompanying illustration we represent the handsome front of the booth occupied by W. T. Wood & Co., Arlington, Mass., at the Pan-American Exposition, Machinery Building. The case shown contains a selection of their well-known line of Ice Tools. Inside the booth is arranged a realistic ice cutting scene, in which the figure of a man, well muffled for winter work, is represented to be running an Ice Plow. The Ice Plow is arranged so that the exact manner in which it does its work in the ice is clearly demonstrated. Another dummy man is shown in the act of splitting off a float of ice with a Splitting Fork. In the rear of this scene is a painting, 6 feet high, which represents a large



Pan-American Exhibit of W. T. Wood & Co.

ice field in the distance, with the open water where the ice has been cut, a string of ice houses into which the ice is being elevated, and a general winter landscape. Just above this is a large frame containing a fine display of highly polished Ice Tools. The line of goods shown in this exhibit includes not only all the Tools that are necessary for harvesting natural ice, but a full variety of the various styles of Tongs, Axes, Saws and other tools employed in handling artificial ice.

H. W. Luetkemeyer & Sons, Cleveland, Ohio, had one of their show windows handsomely arranged for the G. A. R. week, and had it appropriately draped on the day of the McKinley funeral. The goods shown in the window comprised selections from their stock of Tools, Hardware, House Furnishing Goods, &c.

## UNITED STATES OF COLOMBIA.

A large export house in New York quoting late advices from Cartagena, United States of Colombia, say that news in the United States about the revolution there is somewhat exaggerated. Colombian merchants write concerning the political situation that it is not so serious as supposed by Americans, and that war with Venezuela is very remote.

A merchant in Cartagena, writing on the same subject discussing the Colombian decree of July 18, says "the decree issued by the Administration at Bogota did give great authority to Governors of Departments for use in case of war, for the reason that Bogota is so far from the coast in a mountainous country 8900 feet above sea level, without the various channels for transmitting information possessed by nations ordinarily."

It was realized that in the event of war one important source of communication, the Magdalena River, might be cut off and facilities in other directions curtailed as well. The decree referred to granting dictatorial power to Department Governors was a radical one, but was looked upon as a necessary military measure in certain contingencies, in view of some apprehension of trouble on the various frontiers. This decree gave the Governor autocratic power in raising money to equip and maintain armed forces in the field, and its issue has temporarily stagnated business in that country.

To raise revenue for possible war the Colombian Government has monopolized the export of hides; a leading product easily sold. It has also imposed heavy export taxes on such products as coffee, cocoa, rubber, ivory nuts and gold dust, obliging exporters to give it (the Government) drafts on consignees abroad wherever the goods are sent, thus insuring payments in gold of the taxes so levied.

There is no gold or silver in Colombia outside of the Isthmus, where the currency is silver. The condition of their circulating medium is best understood by the current rate of exchange, which has been between 2700 and 3000 per cent. In other words, it takes \$2700 to \$3000 of the country's paper currency to buy \$100 in gold. A year ago exchange was down to between \$300 and \$500.

## EXPORT NOTES.

William McLean & Co., 317-319 Flinders Lane, Melbourne, Australia, merchants' and manufacturers' agents, representing American and Canadian manufacturers in Melbourne, Sydney, Brisbane, Adelaide, Perth and Tasmania, Australia, also New Zealand and the Fiji Islands, announce the departure of their manager, O. L. Remington, on a visit to Europe and America for the purpose of inspecting the late developments in such industries as they are interested in. This tour was prompted by the changed conditions in the Australian Commonwealth, the contemplated revision of tariffs for the whole country, the abolition of all interstate customs tariff and the expected enlargement of present industries. The purpose of this visit is to add to the lines of goods they already represent. Mr. Remington expects to be at the Astor House, New York, about October 21, 22, which will be his headquarters while in this country.

Peck & Co., 24 Nieuwendijk, Amsterdam, Holland, for the purpose of more thoroughly introducing in Europe the product of the Nicholson File Company, Providence, R. I., whose direct representatives they are, have recently published a 48-page pamphlet, entitled "A File Treatise for File Users," in the Dutch language for gratuitous distribution throughout that country and its colonies, to all parties interested in Files. To make plainer the descriptive matter it is generously illustrated.

THE BILLINGS & SPENCER COMPANY, Hartford, Conn., will have samples of the B. & S. Automobile Parts and Machined Steering Equipment on exhibition at the Automobile Show, which will be held in Madison Square Garden, New York City, November 2 to 9. The company will occupy spaces 57, 58 and 59.

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## REQUESTS FOR CATALOGUES, &c.

The trade are given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

Ambrose Bros. have disposed of their stock of Hardware and Farm Implements, at Osceola, Mo., to English & Thomas, and have removed to Loveland, Col., where they have purchased the Hardware and furniture business of J. W. Venacke. They will increase the stock in these lines, and will also add Wagons, Buggies and Agricultural Implements. They will value copies of catalogues, price-lists, &c., relating to the above lines.

Shepherd Hardware Company have purchased the business of E. A. Wisdom, which he has conducted for the past six years at Shepherd, Mich. The members of the new firm are C. F. Johnson, formerly with Mr. Wisdom, who will manage the business, and D. G. Willis, traveling representative in Michigan of the Bostwick-Braun Company, Toledo, Ohio. Mr. Willis also holds a half interest in the Lyons Hardware Company, Lyons, Ohio. The new firm took possession on the 1st inst., and will be pleased to receive catalogues and other printed matter relating to Hardware, Stoves, Paints and Oils, Sporting Goods, Lime, Cement, &c.

## L. S. STARRETT COMPANY'S NEW PLANT.

L. S. STARRETT COMPANY, Athol, Mass., have begun the erection of a group of new buildings. The new machine plant will embrace a combined office and graduating building, machine shop, power house, coal pocket and chimney. The two main buildings on the new site will resemble in shape a carpenter's square: the office building forming the northerly side and the machine building the westerly side. In the inclosure and next to the mill pond will be the steam power plant and chimney. The dimensions of the buildings are as follows: The office and graduating building will be 49 x 160 feet, three and a half stories high. The machine shop will be 50 x 162 feet, four stories high, with a corner tower 70 feet high. The steam power plant is to be 50 x 72 feet and two stories high. Adjoining this will be a coal pocket with a capacity of 400 tons of coal. The chimney will have a height of 100 feet. The office and graduating building will have in the basement a fire proof vault 18 x 25 feet with adequate capacity for books and plans. There will also be a room for employees' bicycles, abundant storage rooms and heating plant for the graduating department. In the main office building will be the executive offices of the company, including accounting room and offices for the president, vice-president and directors. In the rear of this will be a large packing room with cases for finished tools, the cases being placed between each narrow window similar to a stack room in large library buildings. The second floor above will be devoted exclusively to the graduating department, and the third floor will be used as the steel tape department. The machine shop building will have the first floor devoted to the polishing department, and the balance of the building will be used for the various departments conducted by the company. In the tower will be an elevator and stairway, and the top floor will support a 3000-gallon tank for the water supply of sinks and sanitary system, and also a tank which will hold a supply of pure drinking water. In the power building will be rooms for the boiler, engine, electric lighting generator, fire pump, heating system and engineers' repair shop. The entire plant will be heated from one central station blowing hot air by means of large fans to all parts of the works. The construction work will be pushed so that the buildings can be roofed by January 1, and completed for occupancy by April 1, 1902.

## PRIZES FOR TRADE-MARK.

THE BROWN-HURLEY HARDWARE COMPANY, Des Moines, Iowa, successors to J. D. Seeberger, and exclusive wholesale dealers in Hardware, Cutlery and Sporting Goods, offer three prizes, of \$25, \$15 and \$10 each, for the best suggestions for a trade-mark in one or two words, a design or combination of both, for their exclusive use as private brands on various lines

of goods, to stand for the highest grades of material and workmanship. This offer will close November 1.

## DEATH OF E. P. GLEASON.

ELLIOTT P. GLEASON, president and founder of the E. P. Gleason Mfg. Company, died after a short illness at his home in Brooklyn, September 26, in his eighty-first year. He was born in Westmoreland, N. H., June 27, 1821. When 15 years of age he was apprenticed to a tinsmith, but later went to Attleboro, Mass., where he worked at the jewelry business; but not finding it congenial he went to Providence, R. I., where he accepted a clerkship in a general store. Here his inventive faculties showed themselves. Among his early inventions were the process of lettering on glass, a gas tip separate from the pillar, and a shade holder with flexible arms.

In 1854 he formed a partnership under the firm name of Mooney & Gleason for the manufacture of Gas Burners and Supplies for the then growing industry of gas illumination. Among some of the most important articles manufactured by that firm were the American Burner in 1854, Scroll Die in 1860, Rubber Lined Gas Socket for Drop Lights in 1861, Gas Pipe Hook, Gas Torch and Argand Gas Burner. The firm prospered, but in 1867 Mr. Gleason came to New York, where he established himself in Mercer street, near Houston, a short distance from the present building, which was erected in 1872. In 1871 he incorporated the E. P. Gleason Mfg. Company, and branched out into the general fittings and appliances used by gas fixture makers. About that time the company began to make plain and fancy Street Lamps.

In 1876 Mr. Gleason began to manufacture Etched Glass Globes, increasing orders inducing Mr. Gleason to purchase a large glass factory in Greenpoint in 1883, to which a number of buildings have been added since. When electric illumination was developing this company were one of the first to make fittings and appliances solely for electric lighting. Mr. Gleason invented Globe Holders, Insulating Joints and many standard fittings. He also conducted a large knitting mill at Seneca Falls, N. Y., where nearly 400 hands were employed manufacturing knitted underwear. He was likewise the principal owner of the Gleason & Bailey Mfg. Company, Seneca Falls, N. Y., manufacturers of Water Pumps, Fire Apparatus and Fittings. He was vice-president of the Peters Air Pump Company, president of the Lawler Water Feed & Damper Regulator Company and the Steam Boiler Equipment Company of New York, as well as interested in several other manufacturing concerns. He had the faculty of choosing the right sort of lieutenants to aid him in his many ventures, which, being widely separated, could not all receive his personal attention. He employed at least 1000 hands and knew the names of most of them. Though employing both union and nonunion help, according to the location and conditions, Mr. Gleason is said never to have had a strike or any falling out with any of his workingmen, any complaint always receiving immediate attention and, if well founded, being promptly remedied.

His life typifies the restless, active, indefatigable New England inventor, whose genius lies at the base of so much that is finest and best in American achievement in the arts and sciences. A number of nephews who were associated with Mr. Gleason in business will conduct the various branches as heretofore.

## CALDWELL MFG. COMPANY'S CATALOGUE.

CALDWELL MFG. COMPANY, Rochester, N. Y., have just issued a finely printed pamphlet catalogue of Marine Window Hardware which is quite unique in character. Engravings of Side and Top Sash Balances and Side Sash Locks for this class of windows are printed in tinted ink on lithograph paper, which is paneled on a rough surface stiff paper. Descriptions of the goods and list prices are printed on white hand made deckle edge paper. The pamphlet is inclosed in an envelope in harmony with the catalogue.

## HIBBARD, SPENCER, BARTLETT & CO.

**H**IBBARD, SPENCER, BARTLETT & CO., Chicago, have contracted for the erection of the new Hardware warehouse which was mentioned some months since as in contemplation. The site of this warehouse fronts on North Water street, while the rear abuts on the Chicago River. The warehouse will have both rail and navigation facilities. Railroad tracks now run along North Water street, and a spur will be extended into the building which will enable eight to ten cars to be run in under cover. The dimensions of the building are 120 x 400 feet, and it will consist of four stories and a basement. The walls will be constructed of brick and stone, the interior being of heavy mill construction. It is expected that it will be completed by January 1. The company's large store building at Lake street and Wabash avenue will continue to be occupied, as all the space will be needed for their constantly growing business.

## IOWA FARMING TOOL COMPANY.

**T**HE IOWA FARMING TOOL COMPANY, Fort Madison, Iowa, have been enlarging their plant the last two years by the erection of large brick buildings, making a complete plant from forge to furnishing shops. They have recently erected another building to give them two finishing departments in which they will employ about 60 hands to take care of special orders and provide for rush orders in excess of the ordinary seasonable demands. They will thus be able to handle a very much larger trade in the future.

## PRICE-LISTS, CIRCULARS, &c.

**T**HE GOULDS MFG. COMPANY, Seneca Falls, N. Y.: New catalogue in French, showing different styles of their Pumps, Cylinders, Hydraulic Rams and kindred goods. The catalogue, it is stated, embraces many new styles of goods never before illustrated. The publication is also issued both in Spanish and German. Copies will be sent to those applying for them.

**B. BELL & SON**, St. George, Ont.: 1901 catalogue representing their line of Ensilage Cutters, Pulpers, Jack and Speed Gears, Steel Frame Circular Saws, Iron Wagon Wheels, Wheelbarrows, &c.

**THE ADAMS COMPANY**, Dubuque, Iowa: Catalogue No. 7 of the Diamond Adams Hardware Specialties. These Specialties comprise Stove Fixtures, such as Extension Fire Backs, Extension Front Grates, Adjustable Cook Stove Dampers, Stove Pipe Shelves, Stove Pipe Dampers, Damper Clips, Stove Pipe Mandrels and Stove Pipe Register, Stove Covers, Adjustable Oven Shelves, Stove Cover Lifters, Wire Handle Pokers, Stove Knobs and Stove Rods with slotted heads. The catalogue further shows the Diamond Vise, Floor and Ceiling Plates for stove pipe registers; Clothes Reel Iron Centers, Shoe and Lap Lasts, Iron Barrel Trucks, Cake and Meat Grids and Gradometers for use on automobiles and bicycles to show the exact grade in climbing hills.

**LOUISVILLE SHOVEL COMPANY**, Louisville, Ky.: Price-list of the O. K. brand of Shovels, Spades, Scoops, &c.

**INTERNATIONAL SILVER COMPANY**, successors to Simpson, Hall, Miller & Co., Wallingford, Conn.: Catalogue of the Stratford, their latest pattern in sterling silver flat ware. It is referred to as an entirely new design, reproducing the carnation in the way of decoration. It is furnished regularly with the floral decorations finished in French gray, strongly brought out in contrast by burnished bowls, blades and tines. As the pieces are considerably heavier than the same articles in some other patterns, this fact, as well as the price, should be taken into consideration. The Spoons and Forks, as well as all of the fancy pieces shown, including Cutlery, are now ready for delivery, to be followed by additional pieces in the near future.

**WESTERN MALLEABLE & GREY IRON MFG. COMPANY**, Milwaukee, Wis.: Catalogue of 31 pages illustrating their line of Perfection Office Chair and Stool Irons. Since their last catalogue was issued the increase in

their business has been such that they have found it necessary to remove their works from Port Washington, Wis., to Milwaukee, where they have better shipping facilities and where they are in closer touch with the trade. Their floor space was more than doubled by the change.

**A. J. JORDAN CUTLERY COMPANY**, 417 North Broadway, St. Louis, Mo.: Illustrated catalogue and price-list of 136 pages, of fine Cutlery, solid Silver Ware, Silver Plated Ware and rich American Cut Glass, particularly suitable for wedding, birthday and holiday presents. This company are manufacturers, wholesalers, importers and retail dealers in the goods they handle.

**R. E. DIETZ COMPANY**, New York: Illustrated catalogue of Tubular Lanterns and Lights. These goods include a large line required for lighting purposes.

**THE CRONK & CARRIER MFG. COMPANY**, Elmira, N. Y.: Catalogue and price-list illustrating Pocket Knives, Razors and Shears. These goods are shown in a variety of styles and sizes.

## The Avon Design.

**I**nternational Silver Company, successors to Meriden Britannia Company, Meriden, Conn., are now calling attention to the Avon, their new design for the fall in 1847 Rogers Bros. brand. The staple spoons and forks, together with several of the fancy pieces, are now ready for delivery. The line will be completed as early as possible, and will include several new fancy serving pieces, as well as those furnished usually to match their late designs. The price is the same as their other fancy patterns.

## Lane Steel Automobile Jack.

The accompanying cut represents a jack for automobiles, put on the market by the Lane Bros. Company, Poughkeepsie, N. Y. This is a modification of the com-



Lane Steel Automobile Jack.

pany's steel carriage jack to the requirements of automobiles. The lift bars are short and are notched very low, thus adapting the jack to vehicles having wheels as small as 28 inches in diameter. It also takes as large as 40 inches, including all intermediate sizes. The jack is made in two weights, Nos. 11 and 12, with lifting capacities of 1000 and 2000 pounds respectively.

The fall edition of the "Oliver News," issued quarterly by the F. W. Oliver Company, Niagara Falls, N. Y., contains eight pages of illustrations and descriptions of seasonable goods. The publication is now in its third year.

### New Combination Crolard Board.

The accompanying cut represents a new combination crolard board put on the market by Ed. F. Carson, South Bend, Ind. The board has a mahogany finish and is covered with bright green felt. It is provided with pockets, polished brass score plates and hand turned polished balls. The reverse side of the board is arranged as a checker and chess board. The following

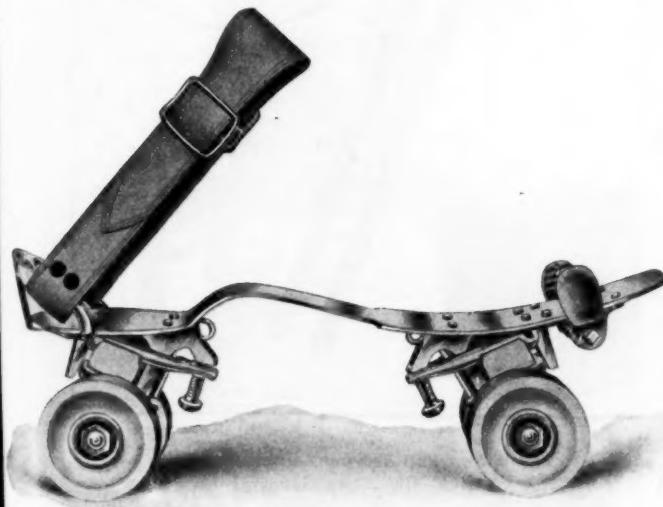


*New Combination Crolard Board.*

12 games can be played on the board: Crolard, rolo, tenpins, ninepins, cocked hat, cushion pin, around the pins, pocket canon, knock out, parlor croquet, checkers and chess. It is stated that by variations a possible 20 games can be played on the board. The illustration shows some of the articles used for playing games.

### Henley's New Ball Bearing Club Skate.

The accompanying cut represents an improved form of ball bearing club skate put on the market by the Henley Bicycle & Roller Skate Works, Richmond, Ind. It is explained that the skate is lighter than formerly, owing to the improved construction and fine quality of material used, yet stronger and lighter running, and



*Henley's New Ball Bearing Club Skate.*

nearly noiseless. The foot plate is spring steel, finely tempered and drawn, having rubber cushions beneath the foot plate. The cups for the ball bearings are now made large enough to admit of the use of 3-16-inch balls,

of which there are nine in each bearing, both on the inside and outside of the wheel, making 144 3-16-inch balls in a pair of skates. The cones are threaded and run up on the axle when adjusted, and are held in position by a lock nut washer, having a lug fitting in a slot in the axle. The bearings are made dust proof by the use of a dust cap fitting over each bearing, both on the inside and outside of each wheel. The cups and cones are firmly ground, tempered and polished, and are equal, it is stated, to the best bearings made for any purpose. Heel pieces are used instead of steel loops for straps, as heretofore.

### The Ideal Straightline Re- and De-capper.

The Ideal Mfg. Company, New Haven, Conn., are about putting on the market the re- and de-capper here illustrated. It is explained that the need of other than the old style recapper arises from the fact that to ignite various powders a great variety of primers are now used which are of different shapes, lengths and diameters. The company claim that the device illustrated will re-and de-cap any and all shells with central fire holes, whether of domestic or foreign manufacture, brass or paper, from 10 to 28 gauge, without any extra parts except a bushing for each gauge. It is remarked that it



*The Ideal Straightline Re- and De-capper.*

makes no difference what the shape or size of the shell may be on the inside, or what the thickness of the head, or what primer may be required. For recapping, the primer inserting punch E in the double crosshead F F projects beyond the larger broad base, which acts as a stop on the head of the shell, thus, it is shown the primers in every case are all seated a uniform depth, which is just below flush with the surface of the top of the head of the shell. For decapping, the stud A is reversed, the hole C in the cross head D D is brought into alignment, and the old primer forced out by pressing on the lever K. It is explained that there will be no injury to the knockout punch, as all parts are in accurate and central alignment when the cross head D D is swung up to the stop rod G.

The partnership heretofore existing under the style of J. F. Barber & Co., wholesale dealers in Hardware, Tools, Cutlery, &c., and manufacturers of Tinware, Philipsburg, Pa., was dissolved on the 1st inst. by mutual consent. On the same day a new partnership was formed under the name of J. H. Turnbach Hardware Company, who will continue the business at the old stand.

### Spring Curry Comb No. 02.

The Sundries Mfg. Company, South Bend, Ind., are offering the spring curry comb here shown. It is referred to as being made of the best quality spring steel, with a malleable iron shank and pressed steel back, all nicely japanned and furnished with a polished maple handle with brass ferrule. This is the same size and shape as the company's No. 1 comb and is made of the same material, but has, in addition, a pressed steel back. This, it is remarked, is a very desirable feature of the

er than the ordinary tubular track. The maple wood shoe inclosed in the lower half of the track is alluded to as making a perfectly noiseless hanger and, with the ball bearings, the least possible friction. The hangers are fitted with hardened steel ball bearings and have a perfect adjustment securely locked.

### The Wilcox Ball Bearing Ladder Fixtures.

The Wilcox Mfg. Company, Aurora, Ill., are putting on the market the trolley ladder fixtures herewith illus-



*Spring Curry Comb No. 02.*

comb, as it is a protection for the hand and keeps the comb in shape. It also assists in cleaning the comb, as it can be struck to jar the dust out.

### The Wideman Narrow Gauge Trolley Ball Bearing House Door Hanger.

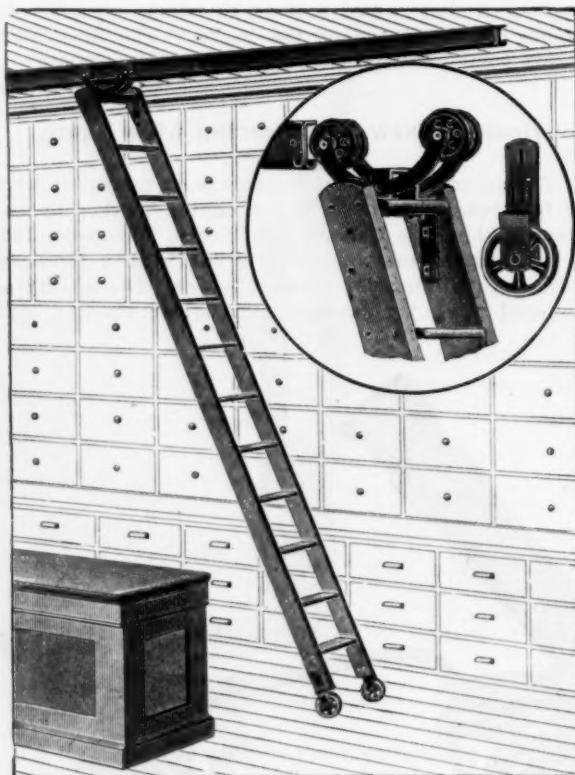
The house door hanger here shown is put on the market by the Wilcox Mfg. Company, Aurora, Ill. The track has a flexible joint at the jamb and is accessible



*The Wideman Narrow Gauge Trolley Ball Bearing House Door Hanger.*

from the opening, thus keeping, it is remarked, the doors plumb with each other and with the jamb. The track and hanger, it is stated, require only one-half the head room that is usually needed. It is pointed out that the form of track adds strength and makes it much strong-

erated. The fixture is made entirely of steel, and the wheels are fitted with rubber tires to render the ladder absolutely noiseless. The points of advantage are thus referred to: That the track is light and strong, double



*The Wilcox Ball Bearing Ladder Fixtures.*

in form, made of 16-gauge steel, that it can be easily attached to the ceiling without brackets, and that the carriers are double, having rubber tires and ball bearings, making them noiseless and frictionless. The track is made in any length, and can be furnished in sections 10 feet long, weighing 2½ pounds per foot. The fixtures weigh 12 pounds per set. Ladders are made of hard pine, filled and varnished; also of oak, filled and varnished.

**The Gem Portable Pivoted Garbage Receptacle.**

Illustrated herewith is a garbage receptacle, placed on the market by Cameron & Purks, Philadelphia, Pa. The device is easily adjusted to a fence, and is centered for the outward swing on malleable iron pivots and cleats.



*Fig. 1.—Gem Portable Pivoted Garbage Receptacle, Yard Side.*

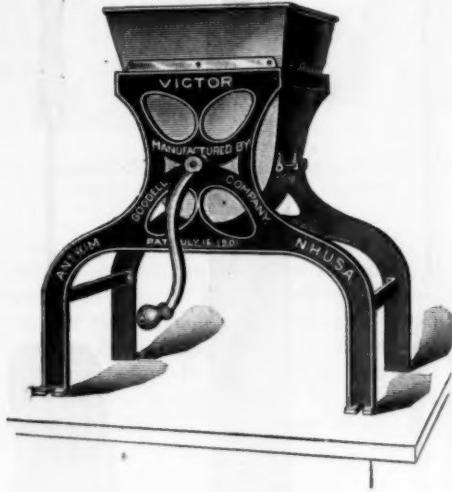


*Fig. 2.—Garbage Receptacle on Public Side.*

It is so arranged as to automatically return to its original position. The lid is mounted on the fence and so adjusted, it is explained, that when opened it must return to the closed position, thus preventing disagreeable odors arising from the receptacle, due to bad fitting or open lids. The receptacle is made of heavy galvanized iron and has a capacity of a bushel of refuse. In dumping it swings to an angle of 45 degrees, and when desired can be lifted from its pivots for cleaning, repairs, &c., and easily replaced. A device is also attached for locking the receptacle on the inner side of the fence, so that it can be emptied at will, at the same time preventing its being tampered with from the outside.

**Victor Vegetable Masher.**

Goodell Company, Antrim, N. H., and 10 Warren street, New York, manufacturers of cutlery and hardware specialties, supplementing their line of bread crumbing machines of somewhat similar construction, have just put on the market the Victor vegetable masher, here illustrated. Potatoes, turnips or vegetables of like character to be mashed after cooking are thrown



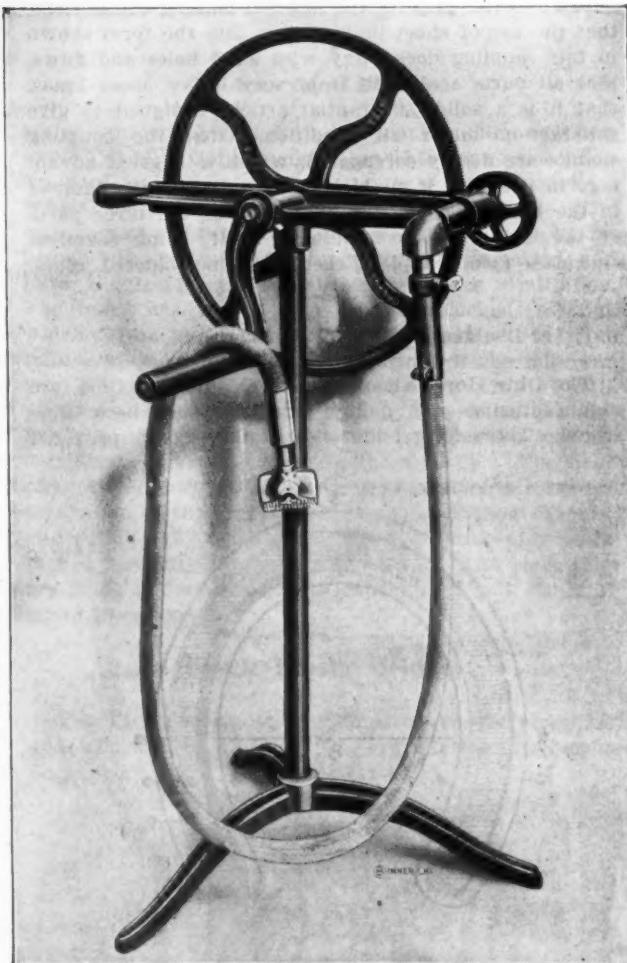
*Victor Vegetable and Fruit Masher.*

into the hopper, the top dimensions of which are 13 x 14 inches, with an extreme depth of 14 inches, when by means of a three-blade reverse curve or S shaped spider, in each of which are three rectangular openings, the material is quickly forced through sieves at the bottom which have a 3-16-inch mesh. The mashing capacity of the machine is given as a bushel of cooked vegetables in four minutes or less. This device is also recommended for mashing fruit, and is intended for such places

as hotels, restaurants, boarding houses, clubs, steamships, canning, preserving and yeast factories, &c. It is said to convert potatoes into a light, flaky and smooth body of even grain. The sieves will not clog and can be taken out for washing and quickly reassembled. There are few pieces in this machine, all the working parts are tinned to prevent rust, and it is solidly built to stand hard usage. We are advised that some of the machines have been tested 18 months in hotels and large kitchens, the device being the idea of a practical hotel man.

**Stewart's Patent Cut Gear Clipping Machine.**

The Chicago Flexible Shaft Company, Chicago, Ill., are putting on the market the cut gear clipping machine herewith illustrated. The driving gear is mounted on a tripod stand in such a manner that the whole frame carrying the wheel, &c., revolves freely and enables the operator to follow the motion of the clipper readily. The



*Stewart's Patent Cut Gear Clipping Machine.*

large wheel, it is remarked, is machined all over, the edges and periphery turned true. The teeth are milled from the solid metal, not cast, and engage with a hardened steel pinion. The pinion shaft is provided with a turned balance wheel, which, it is explained, revolves 2200 times a minute, completely equalizing the motion. The opposite end of the pinion shaft carries a quarter turn box, completely closed and dust proof—the revolving members of which run constantly in oil—to which the flexible shaft is attached. The cutters or knives used are the company's improved one-nut balance pressure, dust proof type. It is pointed out that the machine has a positive driving mechanism, so that when the operator turns the handle of the drive wheel he knows that his effort is being put to useful effect, a certain percentage of power, it is remarked, being lost on belt machines by the belt slipping; also that the balance pressure knife will, under any and all conditions, keep an even, unvarying and equally distributed tension on the blades.

### The Sherman Hose Coupling.

Shown herewith is a hose coupling stamped from sheet brass offered by the H. B. Sherman Mfg. Company, Battle Creek, Mich. It is referred to as having all of the essential features of the cast coupling, with the following improvements: That it gives a full water way in the hose, that it presents a finished appearance in the hose, that the knurled flanges on the union nut

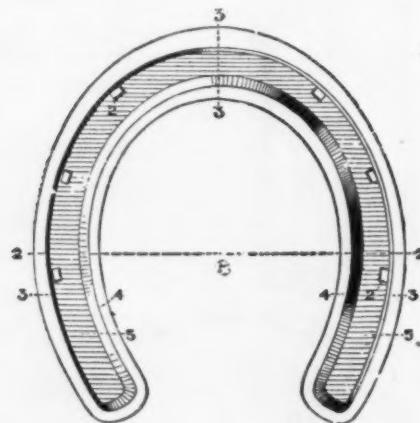


*The Sherman Hose Coupling.*

afford a better grip for the hand in making connections, that the use of sheet brass drawn into the form shown in this coupling does away with sand holes and flaws, that all parts are made from very heavy sheet brass, that it is a solid, substantial article, designed to give satisfaction under all conditions; that the coupling shanks are deeply corrugated, which is a great advantage in itself, as it enables the coupling to be clamped in the hose securely, and that each of the three parts of the coupling is complete in itself, being seamless and made from one piece, there being no soldered joints.

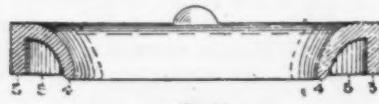
### Hollow Grip Horseshoe.

The Ohio Horse Shoe Company, Columbus, Ohio, are manufacturing the hollow grip horseshoe here illustrated. The sole or under side of this shoe is provided



*Fig. 1.—Hollow Grip Horseshoe, Bottom View.*

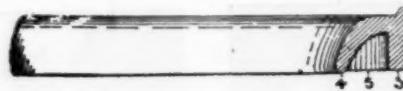
with an outer and inner circle, 3 and 4, located at a convenient distance apart, extending entirely around the inner and outer edges of the shoe, thereby forming a groove or channel, 5. The two rims serve as calks, and upon inspection of Figs. 2 and 3 it will be seen that the inner rim extends below the lower edge of the



*Fig. 2.—Sectional View of Shoe.*

outer circle at the toe 3, so that the inner part will first come in contact with the ground as a horse's foot is lowered, and as a means of relieving the muscles of the leg and shoulder from the strain generally experienced the inner ring is made elastic or resilient. This effect is secured by sloping the ring referred to inwardly, as indicated in Fig. 3, it being enhanced somewhat

by making the same relatively even. The outer rim is comparatively thick at the toe of the shoe, thereby securing rigidity at this place, which is subjected to violent blows. As the horse's foot is lowered the inner circle, 4, strikes the ground, and if the surface is hard it will spring upward. Then the thicker or outer cir-



*Fig. 3.—Side View of Shoe.*

cle, 3, will also strike the ground, but the blow will be materially lessened. Some of the claims of the company for this shoe are as follows: That it is cheaper because it can be fitted without heating; that it wears longer and has no calks to be sharpened; that it is less liable to cause accident to a horse, because it cannot catch in crossing railroad tracks, cable slots, frogs of street car tracks, &c.; that the horse is less liable to cut himself, because he gets a more even bearing and the weight is equally distributed; and that it prevents a horse from slipping on smooth pavements or ice because he gets a grip with the whole surface of the shoe.

### Crescent Kitchen Articles.

The Crescent Mfg. Company, Fremont, Ohio, are offering the fork, spatula and cake turner shown herewith. The flesh fork is 13½ inches over all. The metal part is nickel plated, with black enameled handle. It is designed for general kitchen work, turning roasts being the main object. The long handle is referred to as making the fork particularly desirable for this purpose.



*Crescent Kitchen Articles.*

The tines are bent and are much the same size and construction as an ordinary carving fork. The lightness and durability of the fork are points mentioned by the manufacturers. The kitchen spatula has a nickel plated blade 8 inches long, with a satin wood handle. It is designed for lifting cakes and pies, icing cakes, scraping

bowls, kettles, &c. The steel blade of the drip cake turner is  $3\frac{1}{4}$  inches wide and 4 inches long, and is supplied with an antique oak handle. It is used for turning cakes, fried and poached eggs, meats, fish, &c.

### The Sensible Storm Window Hangers.

Illustrations are herewith presented of the Sensible storm window hangers, patented and manufactured by R. G. Winter, 327 Nicollet avenue, Minneapolis, Minn. Figs. 1 and 2 represent the No. 1 hanger attached and separated and Figs. 3 and 4 the No. 2 hanger attached and separated. Both parts of the No. 1 hanger are made of malleable iron and are of sufficient strength to hold any storm window. Their shape is such as to form an

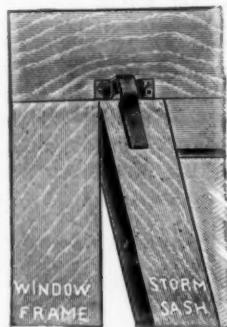


Fig. 1.—Sensible Hanger No. 1, Attached.



Fig. 2.—Sensible Hanger No. 1, Separated.

absolute lock, which prevents the window being blown off the hooks in severe weather. This hanger is also well adapted to use with window screens covering the entire window. The No. 2 hanger is recommended for brick buildings. The part of this hanger to be attached to the casing is made of steel and the part to be fastened to the sash is made of malleable iron, both being light yet strong. These hangers enable a window to be easily hung or taken off from the inside of the house. A

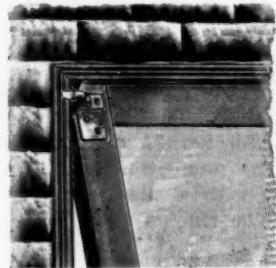


Fig. 3.—Sensible Hanger No. 2, Attached.



Fig. 4.—Sensible Hanger No. 2, Separated.

fastener is also made for use with either of these hangers, which is named the Sensible fastener No. 1, and is illustrated in Fig. 5. It is screwed to the center of the bottom of the storm window in the position shown, while the pin for holding the lever is screwed on the ledge of the window frame. With this fastener the storm sash can be drawn tight to the casing or opened for ventilation. The eccentric slot in the end of the



Fig. 5.—Sensible Fastener No. 1.

lever is designed for use in pulling the sash close to the casing. Another slot enables the lever to be detached from the sash without unscrewing. All these goods have a fine Japan finish.

### The Arras Cream Separator.

The Arras Cream Separator Company, Bluffton, Ohio, are introducing the patent separator herewith shown. The body of the outer or water can is round, and is made of the best grade of galvanized iron. The inner or milk can is flat—slightly oval at the sides to make it strong and best adapted to cool milk quickly. It has a sloping bottom to cause the milk and cream to flow readily toward the faucet. The milk can is placed inside of the

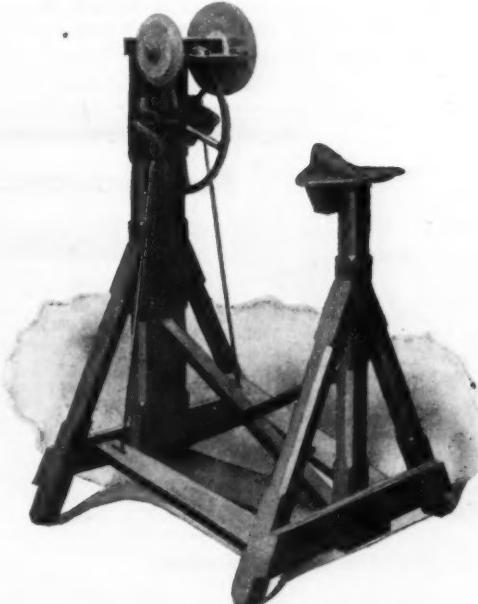


The Arras Cream Separator.

water can, surrounded with water at the sides and bottom. The milk can is made either of tin or copper. The tin used is IXXX bright tin, with a coat of odorless enamel on the outside to keep it from rusting. The copper cans are made of 14-ounce copper, tinned on the inside. The covers of the inner cans are enameled, and have the company's patent strainer with ventilation. The inner can has a large faucet attached, through which cream will flow freely. It is explained that the milk drains down through the bottom of the milk can into the faucet, which will drain every drop of milk without any suction on the cream. The water can also has a large faucet, both of which are of brass, and are detachable to permit cleaning them easily. The company claim that the separator will produce a thorough separation of the cream from the milk without diluting and without any machinery. The inner cans may be detached instantly for repairs if desired. The separators are made in four sizes, with capacity of milk can 4, 6, 8 and 10 gallons.

### Bicycle Emery Grinder.

The Bicycle Grindstone Company, West Thirty-fifth and Iron streets, Chicago, Ill., are offering the bicycle

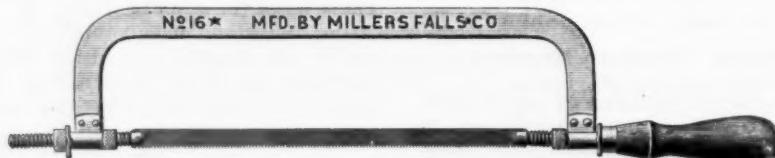


Bicycle Emery Grinder.

emery grinder shown herewith. The frame is made entirely of properly seasoned lumber, braced in a thorough manner with wood and steel. It is provided with an

adjustable cast iron seat, properly secured. The pedals are hinged to the frame by steel hinges, and the pitman rod is so connected, it is explained, that in the event of

stained to resemble cocobola wood. The teeth of the saw blade can be faced either of four different ways, a quarter turn at a time, according to the character of



*Extension Hack Saw Frame No. 16.*

an obstacle striking beneath the pedal the rod is released to prevent damage to the gearing. The head containing the spindle and ball boxes is under cover and protected so that no dirt can interfere with the working parts. There are 20  $\frac{1}{4}$ -inch and 48 5-16-inch steel balls used in the construction of the machine, which can be speeded to from 1800 to 2500 revolutions per minute. One medium grit, 8 x 1 inch, high grade emery wheel is furnished with the grinder. The spindle is constructed so that two emery wheels can be used at the same time. Chuck attachment is furnished at an addition to the

the work. They are put up one in a box and moderately priced.

#### New Model St. Louis Air Rifle.

The accompanying cuts represent a new model air rifle, being brought out by the St. Louis Air Rifle Company, St. Louis, Mo. The rifle has been designed, as to operation, on similar lines to their old model, but the trigger mechanism and the breech are radically different. The trigger valve is closed by the pressure of the



*Single Shot.*

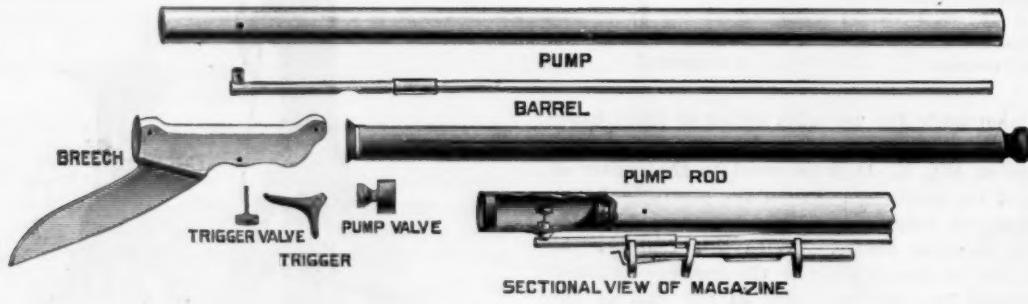


*Repeater.*

*Fig. 1.—New Model St. Louis Air Rifle.*

regular price of the machine. Among the advantages claimed are the following: That the machine is simple in construction; that as compared with a power grinding machine it will do equally as good work; that it is portable and requires but little space; that lost motion on the machine can be easily taken up; that it is constructed without belts or chains, and that the operator sits comfortably while grinding. The makers state that with the machine sickles can be ground, saws gummed, skates ground, razors concaved, metal polished, scissors

air in the chamber, and opens instantly, it is explained, when the trigger is pulled lightly, this construction not being susceptible to injury by any pressure that may be applied, and remaining charged indefinitely. The air chamber has been reduced in size, and one stroke of the pump gives a heavy charge. The breech is of malleable iron, the pump rod of hard maple and the stock of dark satin wood. The pump and barrel are brass. The latter is provided with a slide, which allows a dart to be inserted. The rifle is made in two



*Fig. 2.—Working Parts of Air Rifle.*

and all kinds of tools sharpened, and that it will be found suitable for general farm purposes!

#### Hack Saw Frame.

Millers Falls Company, Millers Falls, Mass., and 28 Warren street, New York, have recently added to their large line of hack saw frames another, as illustrated herewith. It has a substantial, rigid steel frame, the accommodation for saw blades, 8, 9, 10, 11 and 12 inches long, being secured by means of the screw at both ends. The frame is buffed but not nickelized, and the handle is

models—single shot and repeater. The magazine holds about 350 shot of the BB size, and is so constructed that one shot is always in a position to drop into the barrel. This it does when the magazine slides forward, the rifle being turned so as to bring the magazine over the barrel. A coil spring then throws the magazine back and a projection on the breech raises the cut off, enabling another shot to drop into position. It is remarked that with the exception of having to turn the gun to the proper angle, the operation is automatic. The rifle will be ready for delivery, we are advised, on October 15.

# Current Hardware Prices.

REVISED OCTOBER 8, 1901.

**General Goods.**—In the following quotations General Goods—that is, those which are made by more than one manufacturer—are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

**Special Goods.**—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

**Range of Prices.**—A range of prices is indicated by means of the symbol @. Thus  $33\frac{1}{3}\% @ 33\frac{1}{3}\% & 10\%$  signifies that the price of the goods in question ranges from  $33\frac{1}{3}\%$  per cent. discount to  $33\frac{1}{3}\%$  and 10 per cent. discount.

**Adjusters Blind-**

Demarest, P. doz. \$3.00... $33\frac{1}{3}\% @ 33\frac{1}{3}\% & 10\%$   
North's...  
Zimmerman's—See Fasteners, Blind.

**Window Stop-**

Ives' Patent..... $25\frac{1}{2}\%$   
Tappit's Perfection..... $9\frac{1}{2}\%$

**Ammunition**—See Caps, Cartridges, Shells, &c.

**Anvils—American**

Eagle Anvils..... $\frac{1}{2} \& 74\frac{1}{2}$  lbs  
Hay-Budden, Wrought..... $9\frac{1}{2} @ 9\frac{1}{2}$   
Horseshoe brand, Wrought..... $9\frac{1}{2} @ 9\frac{1}{2}$   
Trenton, Wro. ght..... $\frac{1}{2} \& 8\frac{1}{2} @ 8\frac{1}{2}$

**Imported—**

Peter Wright's..... $9\frac{1}{2} @ 9\frac{1}{2}$

**Anvils, Vise and Drill—**

Hillers Falls Co., \$18.00..... $20\frac{1}{2}\%$

**Apple Parers—See Parers, Apple, &c.****Aprons, Blacksmiths'**

Hull Bros. Co.:  
Lots of 1 doz..... $25\frac{1}{2}\%$   
Smaller Lots..... $20\frac{1}{2}\%$   
Lots of 8 doz..... $30\frac{1}{2}\%$

**Augers and Bits—**

Com. Double Spur..... $70@70\frac{1}{2}\%$   
Boring Machine Augers..... $60@10\frac{1}{2} @ 70\frac{1}{2}\%$

Car Bits, 12-in. twist..... $60@60\frac{1}{2} @ 10\frac{1}{2}\%$

Jennings' Pattern..... $50@10\frac{1}{2} @ 60\frac{1}{2}\%$

Ford's Auger and Car Bits..... $40@10\frac{1}{2}\%$

Forster Pat. Auger Bits..... $25\frac{1}{2}\%$

C. E. Jennings & Co.:  
No. 10 ext. lip, R. Jennings' list..... $40\frac{1}{2}\%$

No. 30, R. Jennings' List..... $50\frac{1}{2}\%$

Bussell Jennings'..... $25@10\frac{1}{2} @ 25\frac{1}{2}\%$

L'Hommedieu Car Bits 15&10@15&10@25

Mayhew' Countersink Bits..... $45\frac{1}{2}\%$

Pugh's Black..... $25\frac{1}{2}\%$

Pugh's Jennings' Pattern..... $35\frac{1}{2}\%$

Snell's Auger Bits..... $40\frac{1}{2}\%$

St. J's Ball Hanger Bits..... $50@10\frac{1}{2}\%$

Stell's Car Bits, 12-in. twist..... $60\frac{1}{2}\%$

Wright's Jennings Bits (R. Jennings' list)..... $60\frac{1}{2}\%$

Bl Stock Drills—

Standard List..... $65@65\frac{1}{2}\%$

**Expansive Bits—**

Clark's small, \$18; large, \$26... $50@10\frac{1}{2}\%$

Lavigne's Clark's Pattern, No. 1, P. doz. \$26; No. 2, \$18... $50@10\frac{1}{2}\%$

C. E. Jennings & Co., Steer's Pat. .... $35\frac{1}{2}\%$

Swan's..... $60\frac{1}{2}\%$

**Gimlet Bits—**

Common Double Cut, gro. \$2.25@2.75

German Pattern.....gro. \$2.25@4.50

**Hollow Augers—**

Bonney Pattern, per doz. \$11.00@11.50

Ames..... $25@10\frac{1}{2}\%$

New Patent..... $25@10\frac{1}{2}\%$

Universal..... $20\frac{1}{2}\%$

Wood's Universal..... $25\frac{1}{2}\%$

**Ship Augers and Bits—**

Ford's..... $40\frac{1}{2}\%$

Sell's..... $40\frac{1}{2}\%$

C. E. Jennings & Co. .... $15@15\frac{1}{2}\%$

L'Hommedieu's..... $15@15\frac{1}{2}\%$

Watrous'..... $40\frac{1}{2}\%$

**Awl Hafts, See Hafts, Awl.**

**Awls—**

Brad Awls: Handled.....gro. \$2.75@3.10

Unhandled, Shouldered.....gro. \$3.50@6.00

Unhandled, Patent.....gro. 66@70¢

Peg Awls: Unhandled, Patent.....gro. \$1.34@3.40

Unhandled, Shouldered.....gro. 65@70¢

Scratch Awls: Handled, Common.....gro. \$3.50@4.00

Handled, Socket.....gro. \$11.50@12.00

**Awl and Tool Sets—See Sets, Awl and Tool.**

**Axes—**

First Quality, best brands, \$5.50@5.75

First Quality, other brands \$5.75@5.50

Jobber Special Brands:

Good Quality.....\$1.50@4.75

Best Quality.....\$5.00@5.75

Chap, Handled Axes.....\$5.50@5.75

Bevelled, add 25¢ doz.

**Axle Grease—See Grease, Axle.**

**Axes—**

Concord, Loose Collar.....\$4@50¢

Concord, Solid Collar.....\$4@50¢

No. 1 Common.....\$4@50¢

No. 1½ Com. New Style.....\$4@50¢

No. 2 Solid Collar.....\$4@50¢

Nos. 11 to 15.....\$7@70¢@10¢

Nos. 15 to 18.....\$7@70¢@10¢

Nos. 19 to 22.....\$7@70¢@10¢

Ex. cash 10 days.

**Boxes, Axle—**

Common and Concord, not turned.....

lb. 4½@6½¢

Common and Concord, turned.....

lb. 4½@8½¢

Half Patent.....

lb. 8@9¢

**Balances—** Sash—

Caldwell new list.....\$50

Puilmann's.....\$60

**Spring—**

Spring Balances.....\$5@10@50¢@10¢

Chatillon's:

Light Sqz. Balances.....40@10¢

Straight Balances.....40¢

Circular Balances.....50¢

Large Dial.....50¢

Penoue.....50¢

**Barb Wire—See Wire, Barb.**

**Crow—**

Steel Crookbars, 10 to 40 lb., per lb.

\$2@8¢

**Beams, Scale—**

Scale Beams, List Jan. 12, '98. 40¢@10¢

Chatillon's No. 1.....\$30

Chatillon's No. 2.....\$35

**Beaters—** Egg—

Standard Co.:

No. 5 Steel Handle Dovr. # gro. \$8.50

No. 10 Cast Handle Dovr. # gro. \$8.00

No. 10 St-El Handle Dovr. # gro. \$8.00

No. 15 Extra Heavy Steel Handle. # gro. \$15.00

Rivet, # gro. \$15.00

Taplin Mfg. Co.: # gro.

No. 50 Small Family size.....\$15.00

No. 100 Regular Family size.....\$15.00

No. 102 Regular Family size, tinned.....\$15.00

No. 150 Large Family size.....\$15.00

No. 152 Large Family size, tinned.....\$17.00

Lyon's, Standard size.....\$ doz. \$1.75

Wonder (S. & S. & Co.).....\$ gro. \$7.50

**Bellows—**

Blacksmith, Standard List, 70@70¢@10¢

C. E. Jennings & Co. Blacksmith, \$60@10¢

C. E. Jennings & Co., Hand.....\$3.50

**Blacksmiths—**

Inch... 30 32 34 36 38 40

Each \$4.00 4.55 5.10 5.60 6.40 7.50

**Molders—**

Inch... 9 10 11 12 14 16

Doz....\$6.75 7.25 8.50 9.50 12.00 14.50

**Hand—**

Inch... 6 7 8 9 10 12

Doz....\$3.75 4.25 5.00 5.7 6.75

**Bells—**

Cow—

Ordinary goods.....\$7.50@75¢@10¢

High grade.....\$10@70¢@10¢

Jersey.....\$12@80¢@10¢

Texas Star.....\$15@10¢@10¢

**Door—**

Abbe's Gong.....\$15.00

Bartoon Gong.....\$15.00

None, R. & E. Mfg. Co.'s.....\$15.00

Lever and Pull, Sargent's.....\$10@40¢@10¢

Yankee Gong.....\$15.00

**Hand—**

Hand Bells, Polished.....\$0.45@6¢

White Metal.....\$0.50@5.5¢@10¢

Nickel Plated.....\$0.50@5.5¢@10¢

Swiss.....\$0.50@6.00@7¢@10¢

Silver Chime.....\$0.50@3.50@4.00@10¢

**Miscellaneous—**

Farm Bells.....\$1.2@2½¢

Steel Alloy Church and School.....\$0.50@10¢@60¢

National Bell Foundry Co.: Superior Cast Steel Church and School Bells.....\$0.50@10¢@60¢

Wilmett & Hobbs Mfg. Co. Gong.....\$0.75

**Belting—** Rubber—

Agricultural (Low Grade), 70@10@90¢

Common Standard.....\$70@75¢@10¢

Standard.....\$70@70¢@10¢

Extra.....\$60@10¢@10¢

High Grade.....\$70@10@50¢@10¢

Boston Belting Co.:

Common.....\$70@10@50¢@10¢

Norway Iron.....\$70@10@50¢@10¢

Norway Phila., list Oct. 15, '94.....\$2.50

Eagle Phila., list Oct. 16, '94.....\$0.50

Eagle State, list Dec. 28, '99.....\$7.50

Franklin Moore Co.:

Norway Phila., list Oct. 16, '94.....\$2.50

Eagle Phila., list Oct. 16, '94.....\$0.50

Eclipse, list Dec. 28, '99.....\$7.50

Port Chester Bolt & Nut Company:

Empire, list Dec. 28, '99.....\$7.50

Keystone Phila., list Oct. '94.....\$0.50

Norway Phila., list Oct. '94.....\$2.50

**Leather—**

Extra Heavy, Short Lap.....\$0.50@10@60¢

**Cut Prices.**—In the present condition of the market there is a good deal of cutting of prices by the jobbing trade, whose quotations are often lower than those of the manufacturers.

**Names of Manufacturers.**—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE INDEX SUPPLEMENT (April 4, 1901), which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

**Standard Lists.**—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

**Additions and Corrections.**—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

**Borers, Tap—**

Borers Tap, Ring, with Handle:

Inch.....1¼ 1½ 1¾ 2¼ 2½ 3¼ 3½ 4¼ 5¼ 6¼ 7¼ 8¼

Per doz. \$1.50 5.00 5.75 7.25 7.50 8.25 9.00 10.00 11.50 12.50 13.50 15.00

Inch.....2¼ 2½ 3¼ 4¼ 5¼ 6¼ 7¼ 8¼ 9¼ 10¼ 11¼ 12¼

Per Doz. \$2.50 8.50 10.00 11.50 13.00 14.50 16.00 17.50 19.00 20.50 22.00 23.50

Inch.....3¼ 4¼ 5¼ 6¼ 7¼ 8¼ 9¼ 10¼ 11¼ 12¼ 13¼ 14¼

Per Doz. \$3.50 11.00 12.50 14.00 15.50 17.00 18.50 20.00 21.50 23.00 24.50 26.00

**Boring Machines—** See Machines, Boring.

**Bones, Mitre—**

C. E. Jennings

<b>Cartridges—</b>	
Blank Cartridges:	
30 C. F., \$5.50	10¢@10¢@10%
32 C. F., \$7.00	10¢@10¢@10%
22 cal. Rim, \$1.50	10¢@10¢@10%
32 cal. Rim, \$2.50	10¢@10¢@10%
B. B. Caps. Con. Ball Suggd.	\$1.80@1.85
B. B. Caps. Round Ball	\$1.10@1.15
Central Fire	25¢@25¢@25¢
Pistol and Rifle	15¢@15¢@15¢
Primed Shells and Bullets	15¢@15¢@15¢
Rim Fire Sporting	50¢@50¢@50¢
Rim Fire, Military	15¢@15¢@15¢
<b>Casters—</b>	
Bed	70¢@70¢@10%
Plate	75¢@75¢@10%
Philadelphia	75¢@75¢@10%
Boss	70¢@10%
Boss Anti-Friction	70¢@10%
Martin's Patent (Phoenix)	45¢
Paxton's Anti-Friction	70¢@10¢@10¢
Standard Ball Bearing	45¢
Tucker's Patent, low list	90¢
<b>Cattle Leaders—</b>	
See Leaders, Cattle.	
<b>Chain, Coil—</b>	
NOTE.—The following prices are f. o. b. Pittsburgh. Manufacturers in quoting usually add freight to destination.	
American Coil, Cask lots:	
3-16 " 5-16 " 7-16 " 16 " 9-16 "	
7.75 " 5.50 " 4.50 " 3.50 " 3.50 "	
4 " 1 in. 1 1/4 " 1 1/4 " 1 in.	
2.55 " 5.50 per lb.	3.75 per 100 lb.
Less than Cask lots add 25¢.	
German Coil, list July 24, '97.60@10¢@10%	
<b>Halters and Ties—</b>	
Halter Chains	60¢@10%
German Halter Chain, list July 24, '97	60¢@10¢@10%
Cow Ties	60¢
<b>Trace, Wagon, &amp;c.—</b>	
Traces, Western Standard	100 pairs
6 1/2-8 1/2, Straight, with ring	...\$30.00
6 1/2-6 2, Straight, with ring	...\$31.00
6 1/2-8 1/2, Straight, with ring	...\$35.00
6 1/2-10 1/2, Straight, with ring	...\$38.00
Twist Traces 2¢ per pair for Hooks.	
Twist Traces 2¢ per pair higher than Straight Link.	
Trace, Wagon and Fancy Chains.	50¢@10@50¢@10¢@50¢
<b>Miscellaneous—</b>	
Jack Chain, list July 10, '98:	
Iron	60¢@60¢@10%
Brass	60¢@60¢@10%
Safety Chain	70¢@70¢@10¢@10%
Gal. Pump Chain	lb. 4 1/2¢@4 1/2¢
Cover Mfg. Co.:	
Breadst.	35¢@25¢
Halter	35¢@25¢
Heel	35¢@25¢
Keln.	35¢@25¢
Stallion.	35¢@25¢
Coverd Sad. Works:	
Breadst.	70¢
Halter	70¢
old Back	70¢
Rein	70¢
Oneida Community:	
Am. Coll and Halters	50¢@10¢@50¢@60¢
Am. Cow Ties	55¢@40¢@50¢@50¢
Eureka Coll and Halter	60¢@60¢@50¢
Niagara Coll and Halters	60¢@60¢@50¢
Niagara Cow Ties	45¢@45¢@10¢@50¢
Wire Goods Co.:	
Dog Chain	60¢@10¢
Universal Dbl-Jointed Chain	50¢
<b>Chalk—</b> (From Jobbers)	
Carpenters' Blue	gro. 42@45¢
Carpenters', Red	gro. 37@40¢
Carpenters', White	gro. 35@35¢
See also Crayons.	
<b>Chalk Lines—</b> See Lines.	
<b>Checks, Door—</b>	
Barclay's	40@10¢
Oolumbia	50¢@10¢
Eclipse	60¢@60¢@10¢
<b>Chests, Tool—</b>	
American Tool Chest Co.:	
Boys' Chests with Tools	55¢
Youth's Chests with Tools	40¢
Gentlemen's Chests with Tools	30¢
Farmers', Carpenter's, etc. Chests, with Tools	20¢
Machinists and Pipe Fitters' Chests, Empty	40¢
C. E. Jennings & Co.'s Machinists' Tool Chests	20¢
<b>Chisels—</b>	
Socket Framing and Firmer Standard List	70¢@70¢@10¢
Buck Bros.	30¢
Charles Buck	30¢
C. E. Jennings & Co. Socket Firmer No. 10	60¢@10¢
C. E. Jennings & Co. Socket Framing No. 15	60¢@10¢
Swan's	70¢@10¢
L. & L. J. White	30¢@30¢@5¢
<b>Tanged—</b>	
Tanged Firmers	40¢@40¢@10¢
Buck Bros.	30¢
Charles Buck	30¢
C. E. Jennings & Co. Nos. 191, 181, 25	25¢
L. & L. J. White, Tanged	25¢@25¢
<b>Cold—</b>	
Cold Chisels, good quality, lb. 15@15¢	
Cold Chisels, fair quality, lb. 11@12¢	
Cold Chisels, ordinary, lb. 8@9¢	
<b>Chucks—</b>	
Beach Pat. each \$8.00	20¢
Massy's Planer and Milling	15@20¢
Skinner Patent Chucks:	
Combination Lathe Chucks	40¢
Drill Chucks, Patent and Standard	20¢
Drill Chucks, New Model	2¢
Independent Lathe Chucks	40¢
Improved Planer Chucks	25¢
Universal Lathe Chucks	40¢
Plate Jaws	40¢
Standard Tool Co.	40¢
Improved Drill Chuck	45¢
Union Mfg. Co.:	
Combination	40¢
Czar Drill	30¢
Geared Scroll	30¢
Independent	40¢
Union Drill	30¢
Universal	40¢
Face Plate Jaws	85¢
<b>Clamps—</b>	
Adjustable Hammer	30¢@20¢@5¢
Cabinet, Sergeant's	50¢@10¢
Carriage Makers', P. S. & W. Co.	40¢@10¢
Carriage Makers' Sergeant's	50¢@10¢
Heavy, Parallel	35¢@20¢@5¢
Lineman's, Utica Drop Forge & Tool Co.	40¢
Saw Clamps, see Saw Fliers.	
<b>Cleavers, Sidewalk—</b>	
Socket, All Steel	5¢ per doz. \$4.00 net
W. & C. Snauk, All Steel, 7 1/2 in.	5¢ per doz. \$3.75 net
W. & C. Snauk, All Steel, 7 1/2 in.	5¢ per doz. \$3.25
<b>Cleavers, Butchers'—</b>	
Foster Bros.	20¢
New Haven Edge Tool Co. 's	40¢
Fayette R. Plumb	35¢@20¢@10¢
P. S. & W.	50¢@50¢@25¢
L. & J. White	25¢
<b>Clippers—</b>	
Chicago Flexible Shaft Company	
Handy Toilet	3¢ per doz. \$17.20
Mascotte Toilet	3¢ per doz. \$3.40
Monitor Toilet	3¢ per doz. \$9.00
Stewart's Patent	3¢ per doz. \$10.00
<b>Clips Axle—</b>	
Eagle and Superior 4 and 5-16 inch	70¢@70¢@10¢
Norway, 5 and 5-16 inch	70¢@70¢@10¢
<b>Cloth and Netting, Wire—</b>	
See Wire, &c.	
<b>Cocks, Brass—</b>	
Hardware list:	
Compression and Plain Bibbs	65¢@5¢
Globe, Kerosene, Racking, &c.	
Cocks	65¢@10¢
<b>Coffee Mills—</b> See Mills, Coffee.	
<b>Collars, Dog—</b>	
Brass, Pope & Stevens' list	40¢
Embossed, Gilt, Pope & Stevens' list	30¢@10¢@10¢
Leather Pope & Stevens' list	40¢
<b>Compasses, Dividers, &amp;c.—</b>	
Ordinary Goods	70¢@10¢@75¢
Bemis & Cal. Hdw. & Tool Co.:	
Dividers	55¢
Calipers, Call's Patent Inside	55¢
Calipers, Double	55¢
Calipers, Inside or Outside	55¢
Calipers, Wing	55¢
Compasses	55¢
J. Stevens & T. Co.	25¢@10¢
<b>Compressors, Corn Shock—</b>	
J. B. Hughes' P. doz.	82.50
<b>Conductor Pipe, Galv.—</b>	
L. C. L. to Dealers:	
Territory. Not nested.	Nested.
Eastern	70¢@24¢@5¢
Central	65¢@10%
Southern	65¢
S. Western	60¢@13¢@6¢
Terms. 25 for cash.	
Jobbers receive extra 12 1/2¢@2¢ on car-loads loose, and extra 13¢ on car-loads crated.	
See also Eave Troughs.	
<b>Coolers, Water—</b>	
Nos. 2 3 4 6	
Labrador \$1.50 \$14.00 \$17.50 \$20.00	
8 gal.	
\$24.00	
No. 3 4 6 8	
Iceland \$23.00 \$25.00 \$30.00 \$37.50	
10 14 gal.	
\$27.00 \$72.00	
<b>Coopers' Tools—</b>	
See Tools, Coopers'.	
<b>Cord—</b>	
Sash—	
Braided, Drab	...lb. 25¢
Braided, White, Common	lb. 17@18¢
Cable Laid Italian	lb. A 18¢; B, 18¢
Common India	lb. 9 @ 9¢
Cotton Sash Cord, Twisted	12@16¢
Patent Russia	lb. 1 1/2@18¢
Cable Laid Fusita	lb. 13@16¢
India Hemp, Braided	lb. 14@15¢
India Hemp, Twisted	lb. 10@12¢
Patent India, Twisted	lb. 10@12¢
Pearl Braided, cotton	lb. 17@18¢
Massachusetts, White	lb. 9 @ 9¢
Massachusetts, D. ab.	lb. 9 @ 9¢
Edystone Braided, cotton	lb. 19¢
Harmony Cable Laid Italian	lb. 18¢
Oswann Mills:	
Crown, Solid Braided White	...lb. 22¢
Braided, Giant, White	...lb. 26¢
Patent:	
Cable Laid Italian	16¢
Cable Laid Russia	14¢
Cable Laid India	12¢
Braided India	18¢
Phoenix, White	19¢
Bamson, Nos. 7 to 12:	
Braided, Drab Cotton	...lb. 22¢
Braided, Italian Hemp	...lb. 23¢
Braided, Linen	...lb. 49¢
No. 6, 7, 8 extra	
Silver Lake:	
A quality, Drab, 40¢	
A quality, White, 50¢	
B quality, Drab, 35¢	
B quality, White, 50¢	
Stainless, 40¢	
Linen, 57¢	
<b>Wire, Picture—</b>	
Braided or Twisted	85¢@85¢@10¢
Note.—There is a good deal of confusion in lists, some using old list and others the new list.	
<b>Corn Knives and Cutters—</b>	
See Knives, Corn.	
<b>Corn Planters—</b>	
See Planters, Corn.	
<b>Crackers, Nut—</b>	
Little Giant	50¢
<b>Cradles—</b>	
Grain	50¢
<b>Crayons—</b>	
White Round Crayons, gross, 5¢@8¢	
Cases, 100 gro., \$1.50, at factory.	
D. M. Steward Mfg. Co.	
Metal Workers' Crayons, gr. 22.50	
Sompstone Pencils, round, flat or square	
gr. 21.50	
Rolling Mill Crayons, gr. 22.50	
Railroad Crayons (compo. sition) gr. \$2.00	
Case lots	
<b>Creamery Pails—</b> See Pails, Creamery.	
<b>Crocks, Shepherds'—</b>	
Fort Madison, Heavy	\$1.00 \$7.00
Fort Madison, Light	\$1.00 \$6.50
<b>Crow Bars—</b> See Bars, Crow.	
<b>Cultivators—</b>	
Victor Garden	...doz. \$10.00
<b>Cutlery, Table—</b>	
International Silver Company:	
No. 12 Medium Knives, 1847. ...doz. \$3.50	
Star, Eagle, Rogers & Hamilton and Anchor	
Wm. Rogers & Son	...doz. \$2.50
Simeon L. & Geo. H. Rogers Company:	
12 dwt. Medium Knives	...doz. \$3.00
No. 77 Medium Knives	...doz. \$2.50
<b>Cutters—</b>	
H. H. Mayhew Co.	40¢
Smith & Hemingway Co.	50¢
<b>Cuts—</b>	
Meat	
Hale's, Nos. 11 & 11 1/2 & 11 1/2 & 11 1/2	
Per doz. \$10.80 13 20 18.00	
American	30¢
Nos. 1 2 3 4 5	
Each	5¢ 7¢ 10¢ 25¢ 50¢ 80¢
Connection	
Nos. 20 40 60 80 100 12	
Each	1.75 2.00 2.25 3.00 4.00 4.50
Enterprise	25¢@25¢@7¢@5¢
Nos. 5 10 12 22 32 32	
Each	82 88 92.50 84 86 88
Dixon's, P. doz.	30¢@10¢@40¢@60¢
Nos. 1 2 3 4	
Each	\$14.00 \$17.00 \$19.00 \$20.00
Home No. 1, P. doz. \$22.75	50¢@10%
Little Giant, P. doz.	33¢@25¢@40¢@50¢
Nos. 305 310 312 390 392 398	
Each	\$34.00 \$48.00 \$44.00 \$71.00 \$68.00
Sterling	33¢@5¢
Nos. 1 2 3 4	
Each	\$34.00 \$35.00 \$36.00 \$37.00
Per doz. \$10.80	
<b>Cutter—</b>	
Glass	
H. H. Mayhew Co.	40¢
Smith & Hemingway Co.	50¢
<b>Cuts—</b>	
Meat	
Hale's, Nos. 11 & 11 1/2 & 11 1/2 & 11 1/2	
Per doz. \$10.80 13 20 18.00	
American	30¢
Nos. 1 2 3 4 5	
Each	5¢ 7¢ 10¢ 25¢ 50¢ 80¢
Connection	
Nos. 20 40 60 80 100 12	
Each	1.75 2.00 2.25 3.00 4.00 4.50
Enterprise	25¢@25¢@7¢@5¢
Nos. 5 10 12 22 32 32	
Each	82 88 92.50 84 86 88
Dixon's, P. doz.	30¢@10¢@40¢@60¢
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Little Giant, P. doz.	33¢@25¢@40¢@50¢
Nos. 305 310 312 390 392 398	
Each	\$34.00 \$48.00 \$44.00 \$71.00 \$68.00
Sterling	33¢@5¢
Nos. 1 2 3 4	
Each	\$34.00 \$35.00 \$36.00 \$37.00
Per doz. \$10.80	
<b>Cuts—</b>	
Meat	
Hale's, Nos. 11 & 11 1/2 & 11 1/2 & 11 1/2	
Per doz. \$10.80	
American	30¢
Nos. 1 2 3 4 5	
Each	5¢ 7¢ 10¢ 25¢ 50¢ 80¢
Connection	
Nos. 20 40 60 80 100 12	
Each	1.75 2.00 2.25 3.00 4.00 4.50
Enterprise	25¢@25¢@7¢@5¢
Nos. 5 10 12 22 32 32	
Each	82 88 92.50 84 86 88
Dixon's, P. doz.	30¢@10¢@40¢@60¢
Nos. 1 2 3 4	
Each	\$14.00 \$17.00 \$19.00 \$20.00
Home No. 1, P. doz. \$22.75	50¢@10%
Little Giant, P. doz.	33¢@25¢@40¢@50¢
Nos. 305 310 312 390 392 398	
Each	\$34.00 \$48.00 \$44.00 \$71.00 \$68.00
Sterling	33¢@5¢
Nos. 1 2 3 4	
Each	\$34.00 \$35.00 \$36.00 \$37.00
Per doz. \$10.80	
<b>Cuts—</b>	
Meat	
Hale's, Nos. 11 & 11 1/2 & 11 1/2 & 11 1/2	
Per doz. \$10.80	
American	30¢
Nos. 1 2 3 4 5	
Each	5¢ 7¢ 10¢ 25¢ 50¢ 80¢
Connection	
Nos. 20 40 60 80 100 12	
Each	1.75 2.00 2.25 3.00 4.00 4.50
Enterprise	25¢@25¢@7¢@5¢
Nos. 5 10 12 22 32 32	
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Nos. 305 310 312 390 392 398	
Each	\$34.00 \$48.00 \$44.00 \$71.00 \$68.00
Sterling	33¢@5¢
Nos. 1 2 3 4	
Each	\$34.00 \$35.00 \$36.00 \$37.00
Per doz. \$10.80	
<b>Cuts—</b>	
Meat	
Hale's, Nos. 11 & 11 1/2 & 11 1/2 & 11 1/2	
Per doz. \$10.80	
American	30¢
Nos. 1 2 3 4 5	

**Gates, Molasses and Oil-**

Stevins'..... \$100@10%

**Gauges-**

Mortise, &amp;c. .... 55@10@55@10@10%

Barrett's Comb Roller Gauge. .... 50 doz. \$6.75@7.25

Stanley R. &amp; L. Co.'s Butt &amp; Babbet Gauge. .... 90@10%

Wire Brown &amp; Sharpe's. .... 25@25

Wire Morse's. .... 25@25

Wire P. &amp; W. Co. .... 30@30@10%

Cleats—Single Cut—

Nail, Metal, Assorted, gro. \$1.00@1.60

Spur, Metal, Assorted, gro. \$2.80@3.25

Nail, Wood Handled, Assorted, gro. \$1.75@2.00

Spile, Wood Handled, Assorted, gro. \$3.25@3.50

Glass, American Window

Jobbers' List, Jan. 21, 1901.

Less than Carloads ..... 80@20%

Carloads ..... 85@5%

900 Boxes ..... 87@8%

Clue—Liquid, Fish—

List A, Bottles or Cans, with Brush. .... 37@50@50%

List B, Cans (1/4 pds., pts., qts., qts.) ..... 33@6@18%

List C, Cans (1/2 gal., gal.) ..... 25@45%

International Glue Co. (Martin's) 4@10@30%

Glue Pots—See Pots, Glue.

Grease, Axle—

Common Grade, gro. \$5.00@6.00

Dixon's Everlasting, 10-lb. pails, ea. 85@

Dixon's Everlasting, in bxs. .... 50 doz. 1.50

Snow Flake: 1 qt. cans, per doz. \$2.00; 2 qt. \$3.20; 1/2 gal. cans, per doz. \$6.00; 3 gal. \$16.00; 5 gal. \$24.00

Grindstones—

Bicycle Grindstones, each ..... 32.50@3.00

Pike Mfg. Co.: Improved Family Grindstones, per inch, per doz. .... 32.50@3.25

Pike Mower Knife and Tool, Grinder, each ..... 85@80

Velox Ball Bearing, mounted, Angle Iron Frame, each, \$3.25

Guards, Snow—

Cleveland Wire Spring Co.: Galv. Steel @ 1000 ..... 89.00

Copper @ 1000 ..... 81.00

Gun Powder—See Powder.

Hacksaws—See Saws.

Hawks, Awl—

gro.

Peg Patent, Leather Top. .... \$4.90@5.25

Peg Patent, Plain Top. .... \$3.50@3.75

Sewing, Brass Ferrule. .... \$1.50@1.60

Saddlers', Brass Ferrule. .... \$1.55@1.65

Peg, Common. .... \$1.25@1.35

Brad, Common. .... \$1.50@1.75

Halters and Ties—

Cover's Mfg. Co.: Web ..... 45@25

Jute Hope ..... 45@25

Silk Hope ..... 30@25

Cover's Saddlery Works: Web and Leather Halters. .... 70@

Jute and Manila Rope Halters. .... 70@

Silk Rope Halters. .... 60@20%

Jute, Manila and Cotton Rope Ties. .... 70@

Silk Rope Ties. .... 60@20

Hammers—

Handled Hammers—

Heller's Machinists'. .... 50@50@5%

Heller's Farriers'. .... 60@50@5%

Magnetic Tack, Nos. 1, 2, 3, \$1.25. .... \$1.50

\$1.75

Peck, Stow &amp; Wilcox. .... 50@10%

Fayette R. Plumb: Plum, A. E. Nail. .... 40@10@7.50

Engineers' and B. S. Hand. .... 60@10@24@

Machinists' Hammers. .... 60@

Riveting and Timers'. .... 40@10@7.50

Sargent's U. S. New List. .... 45@

Heavy Hammers and Sledges—

5 lb. and under....lb. 150

5 to 5 lb. ....lb. 300 50@10@80

Over 5 lb. ....lb. 300 10@10

Wilkinson's Smiths. .... 95@20@100

Handcuffs and Leg Irons

See Police Goods.

Handles—

Agricultural Tool Handles—

Axe, Pick, &amp;c. .... 60@60@10%

Hoe, Rake, Fork, &amp;c. .... 60@60@10%

Shovel, &amp;c. .... 50@50@5%

Cross-Cut Saw Handles—

Atkins'. .... 40@50@5%

Champion. .... 45@45@10%

Dixon's\*. .... 50@

Mechanics' Tool Handles—

Auger, assorted. .... gro. \$2.50@3.25

Brad Awl. .... gro. \$1.25@1.50

Chisel, &amp;candles: Apple Tanged Firmer, gro. ass'd. .... \$2.25@2.55; large, \$2.50@2.80

Hickory Tanged Firmer, gro. ass'd. .... \$1.75@2.20; large, \$3.50@3.70

Plane, assorted. .... gro. \$1.00@1.15

Hammer, Hatchet, Axe, &amp;c. .... 60@

Lard Saw, Varnished, doz. 70@75@

Not Varnished. .... 55@80@

Plane Handles:

Jack, doz. 25@25; Jack Bolted. .... 55@60@

Fore, doz. 35@38@; Fore, Bolted. .... 70@75@

Nicholson Simplicity File Handle, gro. .... 30@35@1.50

Hangers—

Barn Door, New Pattern, Round Groove, Regular:

Inch. .... 3 4 5 6 8

Doz. .... \$0.85 1.00 1.50 1.90 2.00

**Barn Door, New England Pattern, Check Back, Regular:**

Inch. .... 3 4 5 6

Doz. .... \$1.30 1.75 2.50 3.00

Chicago Spring Butt Co.:

Friction. .... 25@

Oscillating. .... 25@

Big Twin. .... 25@

Chiisholm &amp; Moore Mfg. Co.:

Baggage Car Door. .... 50@

Elevator. .... 40@

Railroad. .... 55@

Cronk Hunger Co.:

Loose Axle. .... 60@

Roller Bearing. .... 60@10@

Lane Bros.:

Parlor, Ball Bearing. .... 84@

Parlor, Standard. .... 83.25

Parlor, New Model. .... 87.50

Parlor, New Champion. .... 82.25

Barn Door, Standard. .... 60@10@

Covered. .... 50@10@10@5%

Special. .... 60@10@

Lawrence Bros.:

Advance. .... 80@

Cleveland. .... 70@

Crown. .... 60@

New York. .... 60@

Peerless. .... 60@10@

Sterling. .... 60@

McKinney Mfg. Co.:

No. 1, Special. .... 80@10@

No. 2, Standard. .... 60@10@

Stowell Mfg. and Foundry Co.:

Acme Parlor Ball Bearing. .... 40@

Atlas. .... 50@

Badger Barn Door. .... 50@

Baggage Car Door. .... 50@

Climax Anti-Friction. .... 50@

Elevator. .... 40@

Express. .... 50@

Interstate. .... 60@

Lundy Parlor Door. .... 50@

Magic. .... 50@

Matchless. .... 60@

Nansen. .... 60@10@

Railroad. .... 50@

Street Car Door. .... 50@

Steel, Nos. 300, 404, 500. .... 40@10@

Stowell Parlor Door. .... 50@

Wild West, Nos. 300, 404, 500. .... 50@

Zenith for Wood Track. .... 50@

Taylor &amp; Boggis Foundry Co.:

Kidder's. .... 50@15@10@5%

Columbian Hdw. Co.:

American Trackless. .... 33@4@10%

Wilcox Mfg. Co.:

Bike Roller Bearing. .... 60@10@

C. J. Roller Bearing. .... 60@10@

Cycle Ball Bearing. .... 50@

Dwarf Ball Bearing. .... 40@

Ivy, Wood Track. .... 60@10@

L. T. Roller Bearing. .... 60@10@5@5

New Era Roller Bearing. .... 50@10@5@5

O. K. Roller Bearing. .... 60@10@5@5

Prindle, Wood Track. .... 60@

Richards' Wood Track. .... 60@

Richards' Steel Track. .... 50@10@

Speer's Roller Bearing. .... 60@10@

Tandem Nos. 1 and 2. .... 60@

Underwriters' Roller Bearing. .... 40@

Wilcox Auditorium Ball Bearing. .... 20@

Wilcox Barn Trolley No. 123. .... 40@

Wilcox Fire Trolley, Roller Bearing. .... 30@

Wilcox Le Roy Noiseless Ball Bearing. .... 40@

Wilcox New Century. .... 50@10@10@

Wilcox Trolley Ball Bearing. .... 40@

Wilcox Trolley Ball Boarding. .... 40@

Hinges—

McKinney's Perfect Hasp. .... 50@

Wrought Hasps, Staples, &amp;c.—See

Wrought Goods.

Harness Menders—See

Menders.

Harness Snaps—See Snaps.

Hasps—

McKinney's Perfect Hasp. .... 50@

Wrought Goods.

Hay and Straw Knives—

See Knives.

Hinges—

Blind and Shutter Hinges—

Surface Gravity Locking Blind:

(Victor; National; 1888 O. P.; Niagara; Clark's O. P.; Clark's Tip; Buffalo)

No. .... 1 3 5

Doz. pair. .... 50.75 1.45 2.20

Mortise Shutter:

(L. &amp; F. O. S. Dixie, &amp;c.)

No. .... 1 1 1/2 2

Doz. pair. .... 50.60 .55 .58 .46

Mortise Reversible Shutter, (Buffalo, &amp;c.)

No. .... 1 1 1/2 2

Doz. pair. .... 50.65 .60 .55

North's Automatic Blind Fixtures, No. 2, for Wood, \$9.00; No. 3, for Brick, \$11.50

Parker. .... 70@75@

Reading's Gravity. .... 75@10@5

Sargent's, Nos. 1, 3, 5, 11 &amp; 13. .... 70@10@70@20@

Stanley's Steel Gravity Blind Hinges, per doz. sets, without screws, \$0.30;

With screws, \$1.15.

Wrightsville Hdware Co.:

O. S. Lull &amp; Porter. .... 30@24@5%

Acme, Lull &amp; Porter. .... 35@24@5%

Crown City Reversible. .... 75@10@5%

Steiger's Positive Locking, Nos. 1 &amp; 3. .... 70@10@5@5%

Shepard's Noiseless, Nos. 60, 65, 55, 55

Shoemaker's Double Locking, Nos. 20 &amp; 25. .... 70@10@5@5

Champion Gravity Locking, No. 75. .... 75@7@5@5

Steamboat Gravity Locking, No. 10. .... 75@7@5@5

Pioneer, Nos. 000, 45 &amp; 54. .... 75@7@5@5

Empire, Nos. 101 &amp; 103. .... 70@7@5@5

W. H. Co.'s Mortise Gravity Locking, No. 2. .... 50@10@5@5

Hinges with Latches. .... \$1.86 1.90 2.65

**Hinges only. .... \$1.90 1.49 1.00**

Latches only. .... .90 .90 .65

With Latch. .... doz. .... @ \$1.55

Without Latch. .... doz. .... @ \$1.80

Reversible Self-Closing:

With Latch. .... doz. .... @ \$1.80

Without Latch. .... doz. .... @ \$1.65

Western:

With Latch. .... doz. .... @ \$1.50@1.75

Without Latch. .... doz. .... @ \$0.95@1.20

Wrightsville Hdware Co.:

Shepard's or Clark's, doz. sets, No. 1. .... 2 2 3

Hinges with Latches. .... \$1.80 2.00 2.75

Hinges only. .... 1.30 1.50 2.10

Latches only. .... .65 .70 .70

Coat and Hat, Stowell's. .... 70@7@5@5

Coat and Hat, Reading. .... 70@7@5@5

Harness, Reading List. .... 70@10@7@5@5

Wire Coat and Hat:

Acme. .... 10@5@5

B. B. .... 10@5@5

V. B. Brass, Ch. and Cedar. .... 10@5@5

Gem. .... 10@5@5

Bright Wire Goods. .... See Wire Goods.



one.....	14in., 16¢; 2 in., 19¢
Common Sense, 14 in....	\$ per doz. 18¢
2 in., 20¢.	
All-Steel, Nos. 3 and 7, 2½ in....	\$ per doz. 25¢
No. 9, 1½ in....	\$ per doz. 20¢
Extra for Plated Finish....	\$ per doz. 20¢
Extra for Anti-Friction Bushing	\$ per doz. 10¢
and Rapids All Steel, Noiseless....	40¢
Nos. 13, 1½ in....	\$ per doz. 16¢
Bogara.....	18 in., 16¢; 2 in., 19¢
26, Troy.....	14 in., 14½ in., 2 in., 16½ in.
var.....	15 in., 16¢; 2 in., 19¢
Jackie Blocks—See Blocks.	
<b>Pumps—</b>	
Eastern.....	60@ ... \$
Pitcher Spout.....	75@ ... \$
Wood.....	50@ & 10¢
<b>Pump Leathers, Lower and Plunger Valve—Per gro.;</b>	
Inch. 2	2½ 2½ 2½
\$2.20	2.50 2.75 3.00
Inch. 3	3 3½ 3½ 3½ 4
\$3.20	3.60 3.85 4.10 4.40
Burnes Dbl. Acting (low list)....	50¢
Flint & Walling's Fast Mail (low list)....	50¢
Flint & Walling's Pitcher Spout....	75¢
Loud's Suction Pumps, U. S. Co....	20¢
Meyer's Pumps, low list....	50¢
Contractors Rubber Diaphragm Non-shokable, B. & L. Block Co....	30¢
<b>Punches—</b>	
Revolving (4 tubes)....doz.	\$3.75 @ 4.25
Saddlers' or Drive, good, doz.	65 @ 70¢
Spring, single tube, good quality....	
Bemis & Call Co.'s Cast Steel Drive....\$1.65 @ 1.75	
Bemis & Call Co.'s Check.....	55¢
Bemis & Call Co.'s Spring.....	50¢
Niagara Hollow Punches.....	40¢
Niagara Solid Punches.....	55 & 10¢
Steel Screw, B & K. Mfg. Co....	40¢
Tanners' Hollow, P., S. & W. Co....	35 @ 33½ 35¢
Tanners' Solid, P., S. & W. Co., \$ per doz.	
81.44.....	60¢
<b>Rail—Barn Door, &amp;c.—</b>	
Cast Iron, Barn Door: Flange Screw Holes for Rd. Groove Wheels:	
½ in. ....	¾ in. In.
\$1.70	\$2.10 \$5.00 100 feet.
<b>Angular for Sq. Groove Wheels:</b>	
Small, Med., Large.	
\$1.60	1.95 2.70 100 feet.
<b>Sliding Door, Braced W't Iron, ft. \$14¢</b>	
Sliding Door, Iron Painted....2½ @ 3¢	
Sliding Door, Wrought Brass, 1½ in. ....	1½ in. \$1.35
Cronk's Double Braced Steel Rail, foot....	31¢ 65
Cronk's O. N. T. Rail....	31¢ 65
Lanes' O. N. T., \$ per 100 ft., 1 inch....\$2.45	
Lanes' Standard, \$ per 100 ft....	3.75
Lawrence Bros....	5 ft. 44¢
Holmes' Non Bevel.....	5 ft. 34¢
Kinnelley's Standard....	5 ft. 4 ¢
Stowell's Cast Rail....	1½¢
Stowell's Steel Rail, Plain.....	25¢
Stowell's Wrought Bracket, Plain....\$34¢	
<b>Rakes—</b>	
Net Prices, Malleable Rakes:	
10 12 14 16-tooth	
Shank....\$1.50 1.60 1.75 1.85	
Socet....\$1.65 1.80 1.95 2.10	
Sept. 1, 1900, List:	
Cast Steel....70¢ 65¢ 62¢	
Malleable....70¢ 10¢ 75¢ 55¢	
Lawn Rakes, Metal Head, per doz.	
20 teeth....\$3.25 @ 3.59	
24 teeth....\$3.60 @ 3.75	
Fort Madison Red Head Lawn....\$3 25	
Fort Madison Blue Head Lawn....\$3.00	
Jackson Lawn, 29 and 30 teeth....	
\$ per doz. \$4.00	
Kohler's:	
Lawn Queen, 20-tooth, \$ per doz....\$3.60	
Lawn Queen, 24-tooth, \$ per doz....\$3.75	
Paragon, 20-tooth, \$ per doz....\$2.85	
Paragon, 24-tooth, \$ per doz....\$3.00	
Steel Garden, 14-tooth, \$ per doz....\$3.00	
Malleable Garden, 14-tooth \$ per doz....\$2.25	
<b>Rasp, Horse—</b>	
Dishon's....75¢	
Heller Bros., No. 42, \$ per doz....\$9.00	
Fox Razors, No. 44, \$ per doz....\$24.00	
Fox Razors, No. 52, Platina, \$ per doz....\$24.00	
Sub-restein:	
Carbon Magnetic.....	\$18.00
Griffon, No. 63.....	\$15.00
Griffon, No. 60.....	\$12.00
All other Razors.....	40¢
Safety Razors.....	40¢
<b>Razor Straps—</b>	
See Strap, Razor.	
<b>Reels—Fishing—</b>	
Hector, Aluminum, German Silver, Gold, Bronze, Silver, Rubber, Poplite and Salmon, Single Action, Multiplying and Quadruple, all sizes....	125¢
Hendryx Single Action Series, 102P and PN, 202P and PN, 102 PR and PRN, 202 PR and PRN, 304 P and PN, 03034P and PN, 502 and 502N, 502 and 802N, 02054N, Competitor, 50¢	
Hendryx Multiplying and Quadruple Series, 3004N and PN, 4N and PN, 2904N, 2904P and PN, 002904PN, 0924 and 0924N, 5009N and PN.....	40 & 10¢
Shakespeare, Style C.....	25¢
<b>Registers—</b>	
List Sept. 2, 1901.	
Black Jap.....	
White Jap.....	
Bronzed.....	
Nickel Plated.....	
Electro Plated.....	
There is a good deal of irregularity in prices of Registers, especially in Black Japanned, and some jobbers and manufacturers are using the old list.	
<b>Revolvers—</b>	
Single Action.....	80 @ 85¢
Double Action.....	\$1.30
Automatic.....	\$1.75
Hammerless.....	\$1.25

<b>Riddles, Grain or Sand—</b>	
16 in. per doz.	\$2.00@\$2.25
17 in. per doz.	\$2.25@\$2.50
18 in. per doz.	\$2.50@\$3.75
<b>Rings and Ringers—</b>	
<b>Bull Rings—</b>	
Steel.....	\$.80 \$.90
Copper.....	1.10 1.50
<b>Hog Rings and Ringers—</b>	
Hill's Rings...gro. boxes,	\$1.50@\$1.75
Hill's Rings, Gray Iron doz.	.55@\$0.90
Hill's Rings, Mnl. Iron, doz.	.75@\$0.90
Blair's Rings....per gro.	\$3.75@\$6.00
Blair's Rings....per doz.	.60@\$1.70
Brown's Rings....per gro.	\$6.00@\$6.25
Brown's Rings....per doz.	.90@\$1.15
Rapid Rings....per gro.	\$6.00
Rapid Ringers....per doz.	\$3.50
<b>Rivets and Burrs—</b>	
Copper.....	.50@\$0.65%
Iron or Steel:	
Tinners'.....	.70@.70@10%
Miscellaneous.....	.70@.70@10%
<b>Rivet Sets—See Sets.</b>	
<b>Roasting and Baking Pans—See Pans, Roasting and Baking.</b>	
<b>Rollers—</b>	
Aeone, Stowell's Anti-Friction.....	50¢
Farm Door, Sargent's list.....	.50@10&10%
Cronk's Stay.....	63¢
Cronk's Brinkerhoff.....	68¢
Lane's Stay.....	33¢
Stowell's Barn Door Stay...# doz.	\$1.25
<b>Rope—</b>	
Manila, 7-16 in. and larger.....	lb. 10 1/4@10 1/4¢
Manila...36-inch.....	lb. 1 1/4@11 1/4¢
Manila 14 & 5-16 in.....	lb. 1 1/4@11 1/4¢
Manila, Tinned Rope, 15 thread.....	lb. 10 1/4@10 1/4¢
Manila Hay Rope, Medium.....	lb. 10 1/4@10 1/4¢
Sisal, 7-16 in. and larger.....	8 3/4@ 9 1/2¢
Sisal...36-inch.....	8 1/2@ 9 1/2¢
Sisal 14 & 5-16 in.....	lb. 9 @ 9 1/2¢
Sisal, Hay Rope, 2 to 10 ply.....	lb. 8 1/4@ 8 1/4¢
Sisal, Tinned, Medium Lath Yarn.....	lb. 7 3/4@ 8 1/4¢
Cotton Rope:	
Best...1/4-in. and larger lb.	13 1/4¢
Medium...1/4-in. and larger lb.	11 c
Com...1/4-in. and larger lb.	9 c
Jute Rope:	
Thread No. 1, 1/4 in. and up lb.	6 1/2¢
Thread No. 2, 1/4-in. and up lb.	6 c
Yarn, 1/4 in. and up.....	lb. 5 1/2¢
<b>Wire Rope—</b>	
Galvanized.....	.25@7 1/2¢
Plain.....	.30@7 1/2¢
<b>Ropes, Hammock—</b>	
Covert Mfg. Co.....	45&2%
Covert Saddlery Works.....	60&3%
<b>Rules—</b>	
Boxwood...75¢@10¢@10¢@10¢@75¢@10 &10¢@10¢@10¢@5%	
Ivory...55¢@10¢@10¢@10¢@10¢@10¢@10 Chapin-Stephens Co.:	
Boxwood....75¢@10¢@75¢@10¢@10¢@10	
Lufkin's Steel.....	50&10%
Lufkin's Lumber.....	50&10%
Stanley R. & L. Co.:	
Boxwood....75¢@10¢@75¢@10¢@10¢@10	
Ivory.....	55¢@35¢@10¢@10¢
<b>Sad Irons—See Irons, Sad.</b>	
<b>Sand and Emery Paper and Cloth—</b>	
See Paper and Cloth.	
<b>Sash Cords—See Cord, Sash.</b>	
<b>Sash Locks—See Locks, Sash.</b>	
<b>Sash Weights—</b>	
See Weights, Sash.	
<b>Sausage Stuffers or Fillers—See Stuffers or Fillers, Sausage.</b>	
<b>Saw Frames—See Frames, Saw.</b>	
<b>Saw Sets—See Sets, Saw.</b>	
<b>Saw Tools—See Tools, Saw.</b>	
<b>Saws—</b>	
A-1014:	
Circular.....	.50@50&10%
Band.....	.50@10&60%
Cross Cuts.....	38¢
Mulay, Mill and Drag.....	50¢@10%
One-Man Saw.....	40¢
Wood Saws.....	40¢
Hand, Compass, &c.....	40¢
Dudson's:	
Circular Solid and Inserted Tooth	50¢
Band to 14 in. wide.....	60¢
Band 14 to 16.....	70¢
Crosscuts.....	45¢@10%
Narrow Crosscuts.....	50¢@50¢@10%
Mulay, Mill and Drag.....	50¢@10%
Framed Woodsaws.....	35¢@38¢@7 1/2¢
Wood saw Blades.....	40¢@47¢@7 1/2¢
Woodsaw Rods.....	20¢
Hand Saws, Nos. 12, 19, 9, 16, 4100 D. 120, 76, 77, 8.....	25¢@25¢@7 1/2¢
Hand Saws, Nos. 7, 107, 107A, 3, 1, 0, 00, Combination.....	30@30¢@7 1/2¢
Compass, Keyhole, &c.....	25¢@25¢@7 1/2¢
Butcher Saws and Blades.....	35¢@38¢@7 1/2¢
C. E. Jennings & Co.'s:	
Back Saws.....	25¢
Butcher Saws.....	35¢
Compass and K-y Hole Saws.....	25¢
Frame Wood Saws.....	40¢
Hand Saws.....	25@30¢
Wood Saw Blades.....	45¢
Peace:	
Circular and Mill.....	50¢
Cross Cuts, 1st Jan. 1, '90.....	50¢
Hand, Panel and Rip.....	30¢
Richardson:	
Circular and Mill.....	50¢
Hand, &c.....	30¢
X Cuts, 1st Jan. 1, '90.....	50¢
Simonds:	
Circular Saws.....	50¢
Concentric Ground Cross Cut Saws.....	25¢
One-Man Cross Cuts.....	40¢@10¢
Gang Mill, Mulay and Drag Saws, 50¢	
Band Saws.....	50¢
Back Saws.....	25¢@24¢@7 1/2¢
Butcher Saws.....	35¢@38¢@7 1/2¢
Hand Saws.....	25¢@24¢@7 1/2¢
Wood Saws.....	50¢@38¢@7 1/2¢
Hand Saws.....	25¢@24¢@7 1/2¢
Compass, Keyhole, &c.....	25¢@25¢@7 1/2¢
Wood Saws.....	50¢@38¢@7 1/2¢
<b>Hack Saws—</b>	
Dixon:	
Concave Blades.....	25¢
Keystone.....	30¢
Hack Saw frames.....	30¢
C. E. Jennings & Co.'s:	
Hack Saw Frames, Nos. 175, 180, 330.....	40¢
Hack Saws, Nos. 175, 180, 330, com- plete.....	40¢
Griffin's Hack Saw Frames.....	45¢
Griffin's Hack Saw Blades.....	45¢
Star Hack Saws and Blades.....	15@10¢
<b>Scroll—</b>	
Barnes' No. 7, \$15.....	25¢
Barnes' Scroll Saw Blades.....	40¢
Barnes' Velocipede Power Scroll Saw, without bearing attachment, \$18; with bearing attachment, \$30.....	90¢
Lester, compass e., \$10.00.....	15@10¢
Rogers, complete, \$4.00.....	15@10¢
<b>Scale Beams—</b>	
Sea Beams, Scale.	
<b>Scales—</b>	
Family, Turnbull's.....	.30@.30@10¢
Counter:	
Hatch, Platform, 16oz to 10 lbs, doz.	\$5.50
Two Platforms, 1/2 oz to 8 lbs.....	.02@.10¢
Union Platform, Plain...\$1.70@1.90	
Union Platform, Striped \$1.85@2.15	
Chatillon's:	
Eureka.....	25¢
Favorite.....	40¢
Grocers' Trip Scales.....	50¢
Confectionery Postal, Ice, &c.....	70¢
The Standard Portable.....	45¢
The Standard "R. R. and Wagon".....	50¢
<b>Scrapers—</b>	
Box, 1 Handle.....	doz. \$2.25@4.75
Box, 2 Handle.....	doz. \$3.75@4.00
Ship, No. 1, doz. \$3.50; No. 2.....	\$2.25@2.40
Adjustable Box Scraper (S. R. & L. Co.) \$6.00.....	.30@10¢
<b>Screens, Window, and Frames—</b>	
Bonanza Window Screens.....	.60@60&5¢
Five Pattern Window Screen.....	.60@60&5¢
Maine Window Screen Frames.....	40@102&5¢
Perfection Window Screens.....	.60@60&5¢
Phillips' Window Screen Frames.....	.60@102&5¢
Porter's Hummer Window Screens.....	.60@60&5¢
Porter's Klondike Window Screens.....	.60@60&5¢
Wabash Spring Adj. Screen.....	.50¢
See also <i>Doors</i> .	
<b>Screw Drivers—</b>	
See Drivers, Screw.	
<b>Screws—Bench and Hand-Bench, Iron, doz. 1 in., \$5.00@3.5¢;</b>	
1 1/4 in., \$5.50@3.75; 1 1/2, \$4.00@4.50	
Bench, Wood, Beech, doz. \$5.50@3.75	
Hand, R. Bliss Mfg. Co. ....	.35¢@5@10%
<b>Coach, Lag and Hand Rail—</b>	
Common Point, list Oct. 1, '99.....	.75@15@...%
Coach and Lag, Gimlet Point, list Oct. 1, '99.....	.75@10@...%
Hand Rail, list Jan. 1, '91. \$1.80@10@...%	
<b>Jack Screws—</b>	
Standard List.....	.75@75¢@10%
Millers Falls, ...	.50@10&10%
Millers Falls, Roller.....	.50@10&10%
P. S. & W. Co. ....	.50@50¢@5%
Sargent.....	.70@10%
<b>Machine—</b>	
List Jan. 1, '98.....	
Flat or Round Head, Iron, .50@50@10%	
Flat or Round Head, Brass.....	.50@50@10%
<b>Set and Cap—</b>	
Set (Iron or Steel).....	.70@10%
Sq. Hd. Cap.....	.65@10%
Hex. Hd. Cap.....	.65@10%
<b>Wood—</b>	
List Jan. 1, 1900.	
Manufacturers' printed discounts:	
Flat Head, Iron.....	37 1/2@90%
Round Head, Iron.....	35@37 1/2¢
Flat Head, Brass.....	35@37 1/2¢
Round Head, Brass.....	35@37 1/2¢
Flat Head, Bronze.....	75@80%
Round Head, Bronze.....	75@74¢@77 1/2¢
Drive Screws.....	87 1/2@90%
Note.—Extra 5@10% often given.	
<b>Scroll Saws—See Saws, Scroll.</b>	
<b>Scythes—</b>	
Grass Scythes: See Trade Report.	
<b>Scythe Snaths—</b>	
See Snaths, Scythe.	
<b>Seeders—Rails—</b>	
Enterprise.....	.25@30¢
<b>Sets—Awl and Tool Sets—</b>	
Bard Awl and Tool Sets:	
Wood Hdlle., 10 Awls doz. \$2.00@2.25	
Wood Hdlle., 14 Awls, 6 Tools.....	doz. \$2.50@2.50
Aiken's Sets, Awl and Tools:	
No. 20, 5¢ doz. \$10.00; No. 30@10&10%	
Fray's Adl. Tool Hds. Nos. 1, \$12; 5, 8, 10, 12; 4, 9; 5, 8; 10, 12; 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 750,	



Surface:	Some Foundries make price \$1@-\$2@ lower.
Brass King, Single Surface, open back .....	\$3.00
Nickel Plate Surface:	
No. 1001 Nickel Plate, Single Surface	
Washers—	\$3.00
Leather, Axle—	
Solid.....	85¢ 10¢ 10@85¢ 10¢ 10¢ 10¢
Patent.....	85¢ 10¢ @85¢ 20¢
Oil: $\frac{1}{8}$ I. 1 <sup>1/2</sup> 1 <sup>1/2</sup> Inch,	
100 Ic 1 <sup>1/2</sup> 1 <sup>1/2</sup> per 100	
Iron or Steel	
Size bolt ... 5-16	5¢ 5¢ 5¢ 5¢ 5¢
Washers... \$5.10	4.50 2.00 2.0 2.5
in lots less than one keg add 4¢ per lb., 5-lb. boxes add $\frac{1}{2}$ ¢ to list.	
Cast Washers—	
Over $\frac{1}{4}$ inch, barrel lots. per lb....	1 $\frac{1}{4}$ @1 $\frac{1}{4}$ c
Washer Cutters—	
see Cutters, Washer.	
Washing Machines—	
See Machines, Washing.	
Water Coolers—	
See Coolers, Water.	
Wedges—	
Oil Finish.....	lb. 2.00@3.10c
Weights, Sash	
Per ton, f.o.b. factory... \$19.00@22.50	
Some Foundries make price \$1@-\$2@ lower.	
Well Buckets, Galvanized	
See Pails, Galvanized.	
Wheels Well—	
8-4in., \$1 50@1.75; 10-in., \$1.90@2.10;	
12-in., \$2.30@2.75; 14-in., \$3.75@4.65	
Wire and Wire Goods—	
Bright and Annealed :	
6 to 9.....	72¢ 65¢ @72¢ & 10%
10 to 15.....	72¢ 10@72¢ & 10¢ 6%
19 to 26.....	75¢ 10@75¢ 10@75¢
27 to 36.....	75¢ 10@7½@8@8½@%
Galvanized :	
6 to 18.....	70@70¢ 6%
19 to 26.....	72¢ 65¢ @72½¢ & 10%
27 to 36.....	72¢ 6½@7@75¢ & 10¢ 5%
Coppered :	
6 to 9.....	70¢ 5@70¢ 10%
10 to 18.....	70¢ 10@70¢ 10¢ 5%
19 to 26.....	75¢ 7½@75¢ 10@2½
27 to 36.....	75¢ 10@75¢ 10@5%
Tinned :	
6 to 11.....	75@75¢ 7½¢
15 to 18.....	72¢ 45@7½@7½
19 to 26.....	70¢ 65@70¢ 6½@
27 to 36.....	70@70¢ 6½@
Annealed Wire on Spools. 70¢ 5@70¢ 10%	
Brass and Copper Wire on Spools.	
Brass, list Feb. 26, '96.....	60¢@50¢ 10%
Copper, list Feb. 26, '96.....	55¢
Cast Steel Wire.....	15¢
Stubs' Steel Wire.....	50¢
Wire Clothes Line, see Lines.	
Wire Picture Cord, see Cord.	
Bright Wire Goods—	
List April 1, 1901.....	85¢ 10@...
Wire Cloth and Netting—	
Galvanized Wire Netting.....	35¢ @85¢ 5%
Painted Screen Cloth per 100 ft. ....	1\$00@1.10
Light Hardware Grade :	
2-18 Mesh, Plain (8c. list) sq. ft. ....	1 $\frac{1}{4}$ @1 $\frac{1}{4}$ c
2-18 Mesh, Galv. (8c. list) sq. ft. ....	2 $\frac{1}{2}$ @2 $\frac{1}{2}$ c
Wire, Barb—See Trade Report.	
Wire Ro e—See Rope, Wire.	
Wrenches—	
Agricultural.....	70¢ 10@75¢ 10%
Case lots.....	75¢ 10%
Acme.....	60¢ 10%
Alligator.....	70¢
Baxter's S.....	60¢ 10%
Bull Dog.....	70¢
Bentley & Son's :	
Adjustable S.....	35¢ 5¢
Adjustable S Pipe.....	40¢
Briggs' Pattern.....	30¢ 10%
Combination Black.....	40¢ 5¢
Combination Bright.....	55¢
Cylinder or Gas Pipe.....	45¢
Extra Heavy.....	50¢
Merrick's Pattern.....	55¢
No. 3 Pipe, Bright.....	55¢
Bindley Automatic.....	30¢
Boardman's.....	33¢
Coe's' Genuine.....	40¢ 10¢ 5¢ & 10¢
Coe's' "Mechanics'".....	40¢ 10¢ 10¢ 5¢ & 5¢
Donohoe's Engineer.....	40¢ 10¢
Eagle.....	50¢ 10¢
Elgin Wrenches.....	40¢
Elgin Monkey Wrench Blue Jaws.....	33¢
Gem Pocket.....	30¢
Hercules.....	70¢
Knife Handle, Machinists' (W. & B.):	
Case lots.....	50¢ 10¢
Less than case lots.....	50¢ 5¢
Improved Pipe (W. & B.).....	60¢
Solid Handles, P. S. & W. ....	50¢ @50¢ 10¢
Triumph.....	60¢ 10¢
Wrought Goods—	
Staples, Hooks, etc., list March 17 '92.....	10¢ @20¢ 10%
Yokes Neck—	
Covert Saddlery Works, Trimmed.....	60¢ 5¢
Covert Saddlery Works, Neck Yoke	
Centers.....	70¢
Yokes, Ox, and Ox Bows—	
Fort Madison's Farmers & Freighters.....	list ne
Zinc—	
Sheet.....	lb 6 1/4c @5¢

## **PAINTS, OILS AND COLORS—Wholesale Prices.**

<b>White Lead, Zinc, &amp;c.</b>	
Lead, Foreign white, in Oil.	7½@ 9½
Lead, American White, in Oil:	
Lots of 500 lb or over.	8@ 6½
Lots less than 500 lb.	8@ 7
Lead, White, in oil, 25 lb tin pails, add to keg price.	8@ 14
Lead, White, in oil, 12½ lb tin pails, add to keg price.	8@ 1
Lead, White, in oil, 1 to 5 lbs assorted tins, add to keg price.	8@ 1½
Lead White, Dry in bbls.	5½@ 6
Lead, American. Terms: On lots of 500 lbs. and over, 60 days, or 25 for cash if paid in 15 days from date of invoice.	
Zinc, American, dry.	7½@ 4½@ 4½
Zinc, Paris, Red Seal, dry.	8@ 8½
Zinc, Paris, Green Seal, dry.	8@ 9½
Zinc, Antwerp Red Seal, dry.	8@ 6½
Zinc, Antwerp, Green seal, dry.	8@ 7½
Zinc, V. M. French, in Poppy Oil, Green Seal:	
Lots of 1 ton and over.	12@ 12½
Lots of less than 1 ton.	12½@ 12½
Zinc, V. M French, in Poppy Oil, Red Seal:	
Lots of 1 ton and over.	10½@ 11½
Lots of less than 1 ton.	11@ 11½
DISCOUNTS.—V. M. French Zinc.—Discounts to buyers of 10 bbls. lots of one or assorted grades, 1½; 25 bbls., 2½; 50 bbls., 4%.	
<b>Dry Colors.</b>	
Black, Carbon.	7½@ 8@ 20
Black, Drop, Amer.	4@ 7
Black, Drop, Eng.	7@ 11
Black, Ivory.	12@ 21
Lamp, Com.	4½@ 6
Blue, Celestial.	7½@ 4@ 6
Blue, Chinese.	8@ 35
Blue, Prussian.	25@ 34
Blue, Ultramarine.	4@ 20
Brown, Spanish.	1½@ 1
Brown, Vandyke, Amer.	1¾@ 2½
Brown, Vandyke, Foreign.	2¼@ 3½
Carmine, No. 40.	7½@ 20½@ 27½
Green, Chrome, ordinary.	5@ 6½
<b>Colors in Oil.</b>	
Black, Lampblack.	12@ 14
Blue, Chinese.	36@ 40
Blue, Prussian.	32@ 39
Blue, Ultramarine.	15@ 18
<b>Animal, Fish and Vegetable Oils.</b>	
Linseed, City, raw.	7 gal 65@ 66
<b>Miscellaneous.</b>	
Barytes, Foreign, ½ ton.	19.00@ 21.00
Barytes, Amer. floated.	19.00@ 20.00
Barytes, Crude, No. 1.	9.00@ 10.00
Chalk, in bulk.	2.50@ 2.60
Chalk, in bbls.	100 lb @ 35
China Clay, English, ½ ton	12.00@ 17.50
Cobalt, Oxide.	700 lb @ 2.25@ .60
Red, Tuscan, English.	7@ 10
Red, Venetian, Amer.	100 lb @ 80@ 1.75
Red Venetian, English.	110 lb @ 83@ 0.30
Sienna, Italian, Burnt and Powdered.	3½@ 7½
Sienna, Ital. Raw, Powd.	3½@ 7½
Sienna, American, Raw.	1½@ 2
Sienna, American, Burnt and Powdered.	7½@ 2
Talc, French.	7½@ 100 lb \$1.25@ 1.50
Talc, American.	.90@ 1.10
Terra Alba, French.	100 lb .95@ 1.00
Terra Alba, English.	.95@ 1.00
Terra Alba, Americano, No. 1.	.85@ .85
Terra Alba, Americano, No. 2.	.45@ .50
Umber, Turkey, Bnt & Powd.	2½@ 3½
Umber, Turkey, Raw & Powd.	2½@ 3½
Umber, Bat. Amer.	1½@ 2
Umber, Raw, Amer.	1½@ 2
Yellow, Chrome.	10½@ 25
Vermilion, American Lead.	10@ 40
Vermilion, Quicksilver, bulk.	60@ 70
Vermilion, Quicksilver, bags.	6½@ 7½
Vermilion, English, Import.	.50@ .95
Vermilion, Chinese.	1.05@ 1.20
<b>Mineral Oils.</b>	
Black, 30 gravity, 25@ 30 cold test.	7 gal 9½@ 10
Black, 30 gravity, 15 cold test.	10½@ 11
Black, summer.	9½@ 12
Cylinder, light filtered.	14½@ 17
Cylinder, dark filtered.	11½@ 15
Paraffine, 90-90-97 gravity.	12½@ 12
Paraffine, 903 gravity.	11½@ 11
Paraffine, 883 gravity.	9½@ 10
Paraffine, red, No. 1.	12½@ 12
In small lots 1½ advance.	

# THE IRON AGE.

*The oldest paper in the world devoted to the interests of the Hardware, Iron, Machinery and Metal Trades, and a standard authority on all matters relating to those branches of industry.*

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